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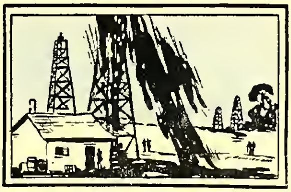
Louisiana Conservation REVIEW



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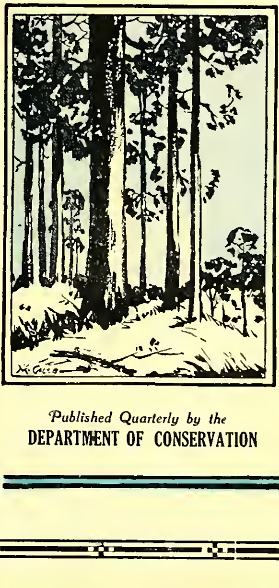

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DEPARTMENT OF CONSERVATION

JANUARY
1935

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LOUISIANA CONSERVATION REVIEW

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VOL. IV   NEW ORLEANS, LA., JANUARY, 1935   No. 5

Trapping Season Reveals Muskrat Scarcity

THE serious and general scarcity of muskrats in Louisiana as already evidenced by the reports of trappers throughout Louisiana is undoubtedly the result of a complicated combination of weather conditions and resultant diseases.

The catch of muskrats, as is also the case in the catch of commercial fishes, is due to two interacting sets of factors: the first, commercial, the second, biological. The commercial factors controlling the prices to be obtained for the rat skins naturally cause an increase or decrease in the trapping effort, and in years of high price the tendency will be to trap more heavily and thus secure proportionately more skins. The biological factors on the other hand control the muskrat supply, and in years of small available supply, no increase in trapping effort can result in any great increase in the total catch.

The biological factors are extremely complicated, since they include weather conditions, the enemies and diseases of rats, the available food supply, and many other agents.

The Department of Conservation in the course of certain of its field investigations observed as long ago as last June that there existed a most serious reduction in the number of rat houses built in some of the areas under study.

Muskrats, like other wild animals, are subject to what may be termed "natural cycles"; that is, fluctuations in abundance that may be extreme and may extend over a whole continent, and yet are due to a success of complex events.

Published quarterly by the Department of Conservation in the interest of protection and proper utilization of Louisiana's natural resources.

JAMES P. GUILLOT.......................Editor
JAMES N. GOWANLOCH........Assoc. Editor
N. E. SIMONEAUX....................Assoc. Editor
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Muskrats are subject to many parasites, including tularemia, a disease transmitted by biting insects. A second diseased condition, coccidosis, is produced by a protozoan that lives chiefly in the liver and intestines of the muskrats. The spread of coccidosis among the muskrats has been shown to be largely due to the conditions of weather, since if the weather is unusually dry, the water fails to wash away and dilute the waste products of the rats in their runs. The vegetation then becomes infected with certain stages of the parasite. Disease is thus communicated to other rats. The most careful studies of the coccidosis disease have failed to reveal any control measures beyond those of changing the general water level.

Louisiana has occupied a unique position in the muskrat fur industry of the whole continent, since in a single year a total of 6,800,000 rats with a value of six and one-half million dollars have been taken within the State. This is the more remarkable since although muskrats of various species and sub-species occur from Newfoundland to Alaska and from California to Louisiana, yet the Louisiana muskrat, restricted in its distribution to the relatively small range of only southern Louisiana with a slight spread eastward into Mississippi and westward into Texas, nevertheless, in spite of this remarkably small range, contributed in a single year seventy-five percent of the total muskrat pelts taken in all North America. The figures for that season (1929-30) are as follows: the total catch of muskrats in the United States reporting areas was 8,435,583, of which no less than 6,269,556 were trapped in Louisiana.

Much of the biology of the muskrat remains still obscure in spite of the great commercial value of the animal and the numerous and searching studies that have been made of it.

The Department of Conservation is keeping in close touch with the muskrat conditions and is doing all that is possible to add to our knowledge of the many contributing factors. It is, however, unfortunate that in the course of these very general and sweeping changes termed natural cycles, there is, as in the case of weather, nothing that human beings can do. The areas involved are so extensive and the numbers of individual muskrats so enormous that any type of medication is obviously impossible, as is also any adequate measure to alter the general water conditions. The only valuable contribution that can be made is the protection afforded by strict enforcement of trapping seasons.

Brief Survey of the Department's Efforts and Achievements During the Five Years of Commissioner Maestri's Regime

The most recent achievements are the establishment of a Geological Survey; the building of additional fish and game preserves such as the Lake Bistineau Game and Fish Preserve in Webster, Bossier, and Bienville Parishes and the Bayou Joson Fish and Game Preserve in Avoyelles Parish, each covering some ten thousand acres of fishing ground—other fish hatcheries at strategic points throughout the State; the beginning and encouraging of an archeological survey through federal cooperation; the undertaking and accomplishing of a number of important research studies covering marine and wild life; establishing a conservation library.

Other accomplishments of the department may be outlined as follows:

Accounting and Administration

The report of the Supervisor of Public Accounts has commented on the administration of the Department's finances as follows:

> "All accounts and records were found in good shape and disbursements supported by good vouchers," and "All receipts were checked from their source and bank balances were verified."

During the entire five-year period the Department has remained within its budget and has carried a substantial bank balance; the savings dervied from the newly established system of economy have been utilized in the establishment of projects created by the Legislature.

Each Division of the Department has been reconstructed with an enlargement and broadening of their respective activities until today the amount of floor space used has been more than trebled. Important legislation has been sponsored and enacted. The conservation laws have been completely compiled and brought up to date, for the first time in the history of the Department.

Education

Commissioner Maestri has established a museum for the permanent display of specimens of the natural resources of the State, as well as an auditorium in which photofilm service is offered daily to the public free of charge. This is the only state-owned conservation museum in the United States and has been visited by more than three hundred thousand persons each year for the past five years.

An extensive lecture system has been established with a view of bringing to every man, woman, and child in the State a personal knowledge of the value of conserving the riches with which the State has been naturally blessed. In addition to these lectures over the State, the publicity department has published for the past four and a half years a monthly and quarterly magazine known as the Louisiana Conservation Review, which reaches not only the citizens of the State of Louisiana and the United States of America, but of every known foreign nation as well. This magazine is issued free, as are also bulletins of interest on subjects of conservation to sportsmen, teachers, scientists, and the ordinary man.

Enforcement

The patrol service of the department has produced increasingly efficient results with a total outlay of less than one-third of the money formerly needed for this work. All of the land and water in the State has been subjected to a most vigilant and rigid inspection in cooperation with the sheriffs of the State, the local parish game protectors, and the federal agents, with the result that today there are fewer violations in Louisiana than ever before.

Fisheries

At strategic points throughout the State, and where the locations are most naturally adapted for the estab-

(Continued on Page 45)

Some Wild Flowers of Louisiana

By

C. A. BROWN [1]
Assistant Professor of Botany
Louisiana State University

EDITOR'S NOTE: *This is the first of a series of articles on the plants of Louisiana. The next will follow at an early date.*

INTRODUCTION

LOUISIANA is particularly fortunate in having within its borders a great variety of herbaceous and shrubby plants with conspicuous flowers; plants which are usually spoken of as "wild flowers". This State is the meeting ground for plants of the Mississippi Valley with those from the East (Florida) and from the West (Texas), as well as with many from the tropics. All of these great regions contribute plants which add to the richness of the local flora.

It is unfortunate that so little has been written in the past concerning the plants of Louisiana. In many states there are books with illustrations and descriptions of the native wild flowers but as yet none has been published for Louisiana. On this account it has been difficult for people interested in plants to become acquainted with even the most common ones. Even some of the more conspicuous and interesting wild flowers like the Iris have been neglected. Previous to 1925, only a few species of Iris were known from Louisiana. Since then, Dr. J. K. Small, of the New York Botanical Garden, has described over eighty new species of Iris in the State. In recent years a large variety of beautifully colored species of Louisiana Iris have been sent all over the world by Dr. Small and others, and consequently these plants are becoming much better known.

At the present time a greater interest is being shown in wild flowers in Louisiana. In the last few years many garden clubs have been formed. In New Orleans, an iris society has been formed for the purpose of growing and preserving the native species of Iris. In various parts of the State, the building of lily ponds and rock gardens has become rather common. Some people are specializing in wild flower gardens. Certain of the beautiful wild flowers adapt themselves readily to cultivation if given the proper growing conditions. All of the attempts to grow wild flowers, unfortunately, have not been as successful as some of the growers would wish. More success will be attained as the growers become better acquainted with the flowers themselves and the conditions under which they grow naturally, and as they understand better the methods of propagation. Some plants can be transplanted better in the spring; with others, the autumn is preferable. Some plants are best grown from seed; others can be propagated readily by cuttings, underground rootstocks, or bulbs.

PRESERVATION OF WILD PLANTS

Rapid destruction of beautiful but slow growing plants by thoughtless people who uproot them, or carelessly break off large branches, has initiated a movement for the preservation of wild flowers. It is not uncommon to see motorists come in from the country with their cars loaded down with dogwood or holly. Such plants, especially in the neighborhood of cities, are being destroyed much more rapidly than they are growing. This is an unfortunate situation which all flower lovers should do what they can to prevent. In some states, the public sentiment against the destruction of wild flowers is so strong that legislation has been passed for their protection or for the creation of flower sanctuaries. "Enjoy but do not destroy" is a slogan which should be adopted. The society for the preservation of wild flowers has compiled a useful list of plants which may be picked without causing harm and also a list of those which are in danger of extermination by uncontrolled picking.

DISTRIBUTION OF PLANTS

Some plants are found in one part of the State and some in the other sections. The reasons for this are the variations in environmental conditions and the differences in the individual requirements of the plants. The environmental factors that affect the distribution of plants may be grouped under climatic factors, edaphic factors, and biotic factors.

---

[1] The writer wishes to express his appreciation to those who have aided in the preparation of this publication, in particular to Professor C. W. Edgerton for helpful suggestions, to Professor E. B. Doran for the lettering, to Miss Anita Durand who made the illustrations, and to Mr. James P. Guillot, Secretary, Louisiana Department of Conservation, for valuable assistance.

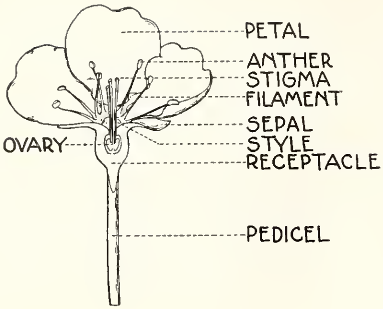


FIG. 1. PEAR BLOSSOM WITH PARTS OF FLOWER REMOVED

The climatic factors are extremely important in plant distribution. The differences in temperature between such widely separated places as Shreveport and New Orleans are sufficient to explain the distribution of some plants. The warm, mild climate of New Orleans permits the growth of certain tropical plants but is not satisfactory to certain others requiring different temperature conditions. The variations in sunshine, rainfall, and wind also tend to affect the distribution of plants.

The edaphic factors are those which affect the plants through the soil. The chemical and physical properties of the bluff soils are different from those of the alluvial sections and different plants occur in the two areas. Other soil factors of importance include soil moisture, soil acidity, and the presence or absence of certain minerals.

Biotic factors are those which result from contact with other plants and animals. The "Love vine", or dodder, or "Fil d'Amour" as it is called in Louisiana, lives as a parasite upon other living plants. The familiar Mistletoe depends upon other plants for part of its nutrition and its distribution is aided by the birds which eat its white berries.

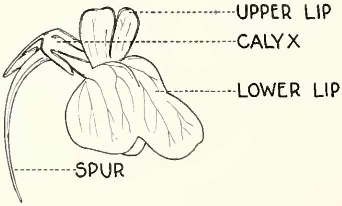


FIG. 2. BLUE TOAD-FLAX BLOSSOM

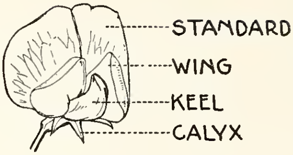


FIG. 3. SWEET PEA BLOSSOM

Man has also been responsible for the present distribution of plants, to a certain extent. When Louisiana was first settled, he brought in plants for food and ornamental purposes. He is also responsible for the destruction of many plants. The stately forests of pine have been destroyed and with them many beautiful wild flowers which grew under the trees. The annual burning of the fields and drainage of swamps have contributed to the destruction of some plants. However, many noxious weeds have been introduced which thrive in cultivated fields and waste places.

Plant Names

The everyday or common names of plants vary in different parts of the state, in different states, and in different countries. For example, the Showy Primrose (*Oenothera speciosa*) is called Buttercup in southern Louisiana, and just across the State line in Mississippi the name Buttercup is applied to the Pitcher Plant (*Sarracenia sledgei*). In Vernon Parish, Louisiana, this same Pitcher Plant is called Ladies' Slipper, a common

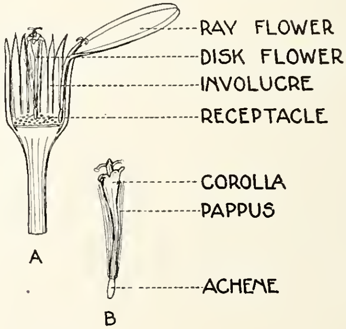


FIG. 4.
A. PORTION OF FLOWER CLUSTER OF BUTTERWEED
B. DISK FLOWER ENLARGED

name usually given to certain orchids. Scientific names, on the contrary, are usually more reliable. Botanists in any part of the world can find out the plant to which reference is made when the scientific name is given. For this reason, scientific names are usually used.

Naming of Plants

People desire to know the names of plants sometimes because of their economic possibilities, sometimes because they are thought to be poisonous or noxious weeds, and sometimes because of the attractiveness of the flowers. It has been the custom for members of the Botany Department of the Louisiana State University, Baton Rouge, Louisiana, to name the plants sent in for identification, when possible. This service is rendered to the people of the State without charge. In order to aid in the identification of the plants, the following directions are suggested:

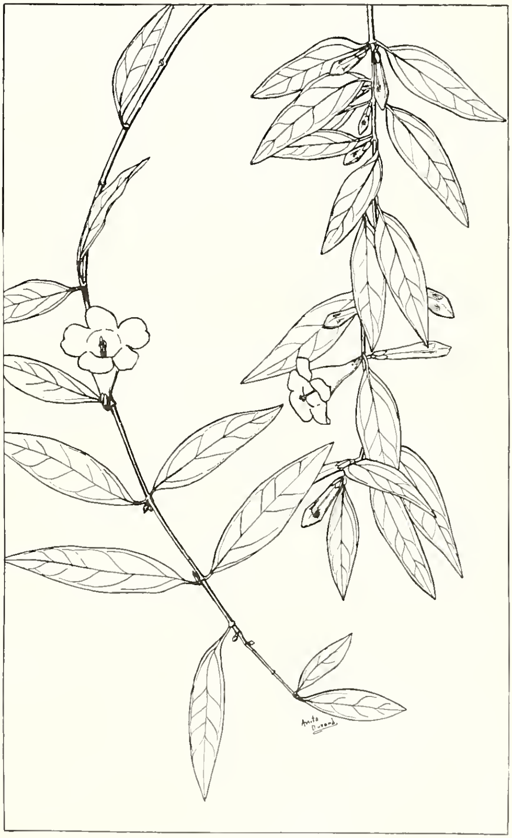
1. Take all of the plant where it is less than three feet tall, and bend it into short lengths. When the plant is over three feet tall, take the top fourteen inches and the basal portion of the plant.
2. Always send flowers and fruit when possible as they are necessary in the identification of the plant.
3. If more than one plant is sent at the same time, place a number on each plant and keep a sample with the same number. Replies will refer to the specimens by number.
4. Include the following information: Location, town and parish; type of place where the plants grow such as swamp, roadside, cultivated fields, shady woods, etc.; color of the flowers as the color often disappears upon drying; and the date when the plants were collected.

Flower Structure

These flower descriptions are written with the use of as few technical terms as possible. To aid in understanding them, the following discussion and accompanying diagrams of several different types of flower structure are included.

A *complete flower* consists of two sets of organs, the reproductive organs, stamens and pistil; and the floral envelope composed of the petals and sepals. (Figure 1, pear blossom). The stamens and pistil function in the formation of fruit and seed. The floral envelope protects the reproductive organs and often serves to attract insects. The term calyx is used to designate all of the sepals, and the term corolla to designate all of the petals. Perianth is a term which includes the calyx and the corolla.

The calyx is the outermost whorl of parts and is usually colored green. The corolla is inside of the calyx and is usually the bright and showy part of the flower. The stamens are within the corolla and consist of pollen sacs (anthers), borne upon stalks (filaments). The pistil is usually composed of three parts: stigma, style, and ovary. Seeds are produced in the ovary. All of these organs are modified in various ways, and one or more parts may be missing.



JESSAMINE, YELLOW JESSAMINE

Gelsemium sempervirens (L.) Ait. f.

Logania Family Loganiaceae

Most people know the Yellow Jessamine as it is one of the early, conspicuous, flowering plants. Its golden flowers burst into bloom, as if by magic, in fence rows, in roadside thickets, and in the tops of trees, following the first warm days of early February. The plant is cherished not only for the beauty of its blossoms, but also for its delicate fragrance.

It is a perennial, woody vine which twines and climbs over fences and bushes and into the tops of trees. The long-pointed leaves are opposite each other and the fragrant, yellow, bell-shaped flowers are borne in the axils of the leaves. The stamens and pistils are of different lengths in the same and in different flowers. In one flower the stamens will be long and the pistil short, and in the next flower this arrangement may be reversed. This device aids in cross pollination of the flowers.

It blooms from early February until late in April.

Common and widely distributed in most of Louisiana, and is frequently used as an ornamental vine.

Illustration one-half natural size.

A *regular flower* is one which has the individual parts of the floral envelope symmetrical and uniform in regard to shape, size and structure. When the petals of such a flower are distinct and separate from each other, it is said to be *polypetalous,* as for example, the pear blossom (Figure 1). When the petals are fused to each other to form a *united corolla,* the flower is said to be *gamopetalous,* as for example, the yellow jessamine.

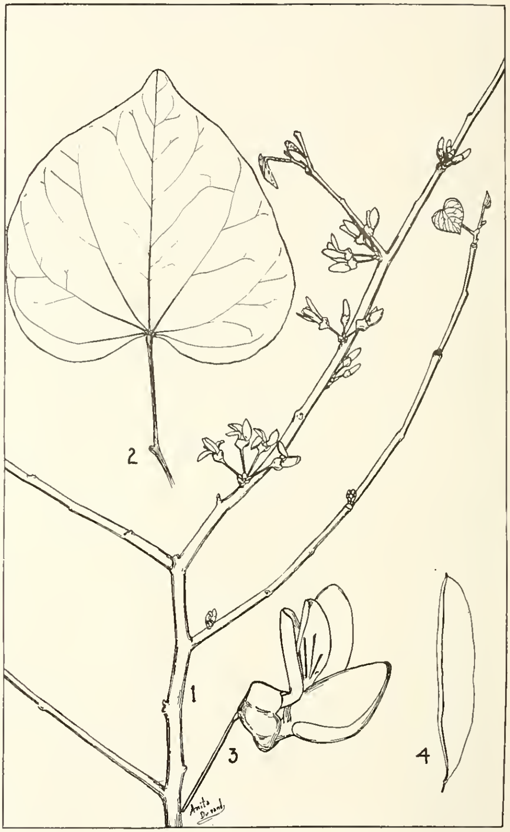
An *irregular flower,* on the other hand, is one which has unlike petals, these differing either as to shape or size. The two-lipped (bilabiate) flower of the blue toad flax (Figure 2), the papilionaceous flower of the legume (Figure 3), and the ligulate or ray flower of the compositae are all good examples of irregular flowers. The corolla of the honeysuckle is also irregular.

The flowers of most legumes are of a characteristic butterfly shape and the different parts of the corolla have been given special names. The small boat-shaped structure on the underside of the flower is called the *keel.* It is composed of two petals fused together on one side. On each side of the keel and more or less united with it are specialized petals called the *wings.* Back of these structures is the broad petal called the *standard.* Only after these parts have been removed or separated are the stamens and pistil visible. The sweet pea (Figure 3) and red bud have flowers of this type.

In the Compositae, the largest group of flowering plants, the inflorescence is so arranged that the individual flower is subordinate to the flower cluster. What is commonly considered as the flower is not a single flower, but a cluster of many flowers. The green bracts under the flower cluster are not the calyx lobes, but are involucral bracts. Each of the conspicuous structures which resemble petals are individual flowers called *Ray* or *Ligulate flowers.* The colored part is the corolla. At the base of the corolla is an inferior ovary, at the top of the ovary and around the corolla are numerous fine bristles or scales called the *pappus.* The pappus is the morphological equivalent of the calyx. In the center of the flower cluster are smaller, regular, and less conspicuous flowers. These are the *Disk flowers.* The ovaries of these flowers are inferior and inserted on the receptacle (Figure 4).

POLLINATION OF FLOWERS

Pollen grains are produced in the anther sac of the stamen. The transfer of these to the stigma of the pistil is called *pollination.* The two major methods of effecting this transfer



RED-BUD, JUDAS-TREE

Cercis canadensis L.

Legume Family **Leguminosae**

The Red-bud is a tree which blossoms in early spring. The clusters of pinkish blossoms appear before the leaves and consequently give the tree a very striking and attractive appearance.

The name, Judas-tree, is commonly used because of an old legend. It is said that Judas hanged himself from one of these trees, and ever since, blushing with shame, the tree has produced the pink blossoms.

The red-bud is often damaged rather severely by vandals who tear off armloads of its branches with their delicate pea-like flowers. Fortunately, however, it is a rapidly growing tree, and recovers rather rapidly. For those who enjoy the flowers, it would be better to plant the trees where they can be seen. This tree is especially desirable for ornamental planting as young plants only three or four years old will bloom profusely. These small trees can be easily transplanted. Nursery stock is more satisfactory than plants found in the woods because the cultivated specimens have better form. Trees five to six years old often have a height of 15 to 20 feet with a trunk diameter of two to three inches.

The red-bud makes a tree six to ten inches in diameter, and twenty-five to thirty-six feet in height. The alternate heart-shaped leaves which appear after the flowers are a dark, glossy green. The flowers, pinkish to purplish in color, are shaped like miniature sweet pea blossom. The fruit is a flat, brownish peapod.

It blooms from the middle of February into March. The fruit matures in July.

It is widely distributed in Louisiana and especially abundant in the northern part of the State, where it is planted extensively as an ornamental tree. It is found in abandoned fields, cut-over, and open wood lands, but prefers rich, moderately well drained soils.

Illustrations:

1. Flowering branch, about one-half natural size.
2. Mature leaf, about one-half natural size.
3. Flower, about two and one-half times natural size.
4. Seed pod, about one-half natural size.

are by wind and by insects. Wind pollination is characteristic of plants with inconspicuous flowers such as grasses, oaks, birches, poplars, and pines. The pollen grains of the pine have two air sacs or "wings" which enable them to float in the air or be blown great distances. Many plants depend upon insects to transfer the pollen from the stamens to the stigmas. Usually the stamens are so placed that an insect, in search of nectar, unknowingly secures a load of pollen which is later brushed off on the stigma of another flower of the same species. This transfer of the pollen from the stamen of one flower to the pistil of another flower is called *cross pollination.* Yellow jessamine is a plant which has the reproductive organs arranged for cross pollination by insects.

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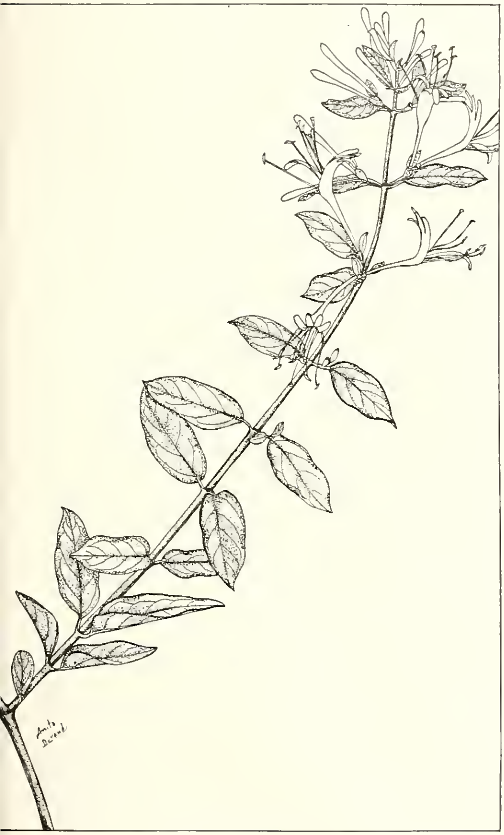


HONEYSUCKLE
Lonicera japonica Thumb.
Honeysuckle Family **Caprifoliaceae**

The fragrance of this plant is so intimately associated with romance er the soft southern moonlight that we fail to realize that it is not a ve. To see how luxuriantly it grows in fence rows and waste places would not guess that it had been imported from Asia.

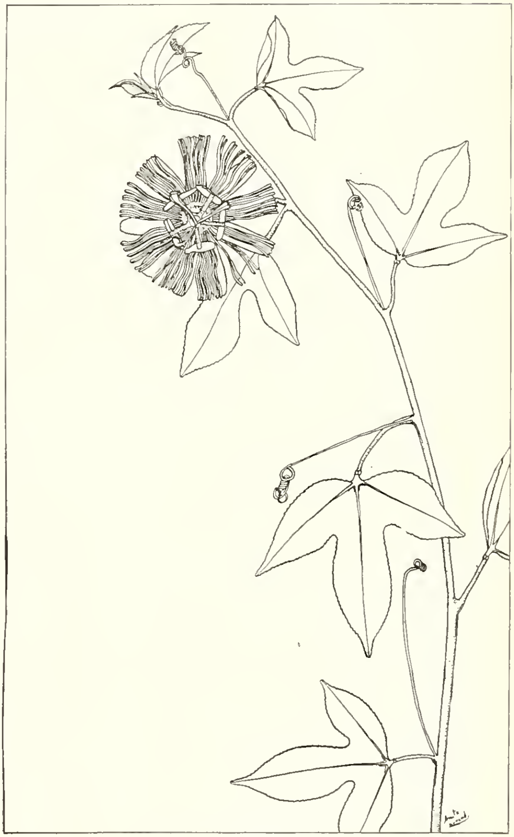
This honeysuckle is a fast-growing, climbing vine and will cover up cts over which it is growing. It is frequently used to screen unsightly es. It has also been used as a soil binder in hill sections where the soil ubject to rapid erosion. It must be used with care in the garden as it ds to crowd out other plants by its rapid growth.

It is a twining, woody, vine with opposite, usually evergreen leaves. white flowers are borne in pairs in the axils of the leaves. The outside ha flower is frequently pink, and most flowers turn a deep yellow with . The fruits are small, black berries.

It blooms from early spring to late fall.

Widely distributed in Louisiana. Particularly abundant around deserted llings, fence rows, and roadside thickets.

Illustration about one-half natural size.



MAYPOP, PASSION FLOWER
Passiflora incarnata L.
Passion flower Family **Passifloraceae**

The Maypop is familiar to nearly everyone. To some it is a surprise that such a non-attractive vine should bear such beautiful flowers. The beauty of the flower is not in the colors of the floral parts, but rather in the delicate construction and arrangement of the parts. The fine, radiating, wavy, vari-colored fringe is an accessory part of the flower which adds to its attractiveness. The fruit is often eaten in Louisiana.

It is a perennial vine which climbs over bushes and fences by means of tendrils. The leaves are alternate and deeply three lobed. Two conspicuous glands are borne on the petiole near the base of the blade. The flowers are mottled purple and white, primarily due to the colored fringe. Five drooping yellow stamens are suspended around the pistil which has three to four drooping stigmas. The fruit is a green berry, ovoid to spherical in shape, and 3-5 inches in diameter.

It blooms from May to September.

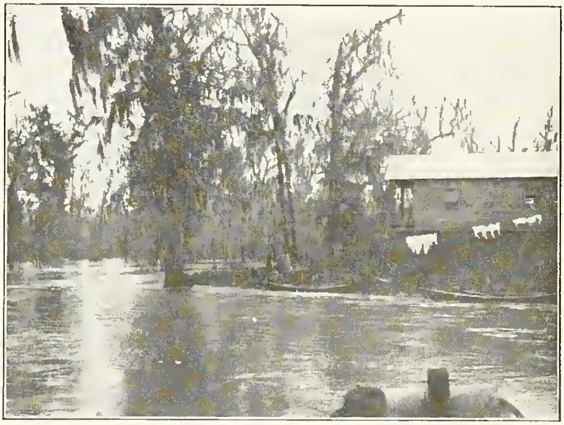
Widely distributed throughout Louisiana, and especially common along fence rows and margins of cultivated fields.

Illustration about one-half natural size.

An Introduction to Louisiana Archeology

By J. A. FORD,
Louisiana State University

CONTRARY to popular belief, the history of the region included within the present bounds of the State of Louisiana begins not with the discovery of the Mississippi River, but long before that time, even before the dawn of the Christian Era. The pre-Columbian inhabitants of Louisiana and neighboring southern states were neither the "wild and woolly" Indians of ten-cent novel fame, nor the romantic people of the *Leatherstocking Tales.* They were farmers who lived in villages situated on favorable spots on the waterways and tilled their laboriously cleared fields of corn, beans and pumpkins. Wild game formed only a part of their diet, and they had no domestic animal except the dog. Slaves to their religion, they built vast earthworks for temple sites and monuments to the dead. Some of these rival the pyramids of Egypt in size. Protective fortifications encircling many of the villages indicate interludes of warfare, probably struggles between the different groups for the more favorable sections of territory. In many ways their culture might be compared with that of the European barbarians in the days when Julius Caesar was conquering Gaul.



House built on Indian mound which is located on the right bank of Lake La Rose. This stream lies in the eastern portion of St. Martin Parish. This photograph was taken during the flood season.

Ruins of old Indian villages, fortifications and burial sites are scattered along the borders of the streams and lakes of Louisiana in almost unbelievable numbers. These indicate a fairly dense ancient population and occupation over a long period of time.

The paucity of present information concerning these dwellers in Louisiana is partially due to the meager records left by early white explorers and settlers, but lack of knowledge of their history is due more to the ignorance of the Indians themselves. This lack of knowledge resulted, of course, from absence of any form of writing. It is true that traditional tales of tribal origin and movements were passed from generation to generation, but little or no reliance may be placed on them. While some phases of these legends may have been founded on fact, in their entirety they have taken on such a mythological cast that the truth is very obscure.

Thus the student in beginning the labor of reconstructing the fascinating past hinted at by the great earthworks and extensive village sites must start with the authentic accounts of the early explorers. The first step in recovering this lost history is to locate by means of the early descriptions and

Another photograph of the Indian mound shown in preceding photograph. Photograph taken during the low water season.

Small Indian mound along Bayou Garafier, a stream which flows out of Lake La Rose. Photograph taken during flood period in the Atchafalaya basin.

maps the sites inhabited at the time of first contact with Europeans. From this point the story may be followed back into the unknown past by the aid of one of the dominant axioms of culture: it is always changing. It should be understood that by "culture" is meant the component of the customs and styles of languages, handicrafts, arts and ceremonials practiced by any particular group of people at any one time. Culture is in reality a set of ideas as to how things should be done and made. It is in a continuous state of evolutionary change since it is constantly influenced both by inventions from within and the introduction of new ideas from without the group. Such change taking place in our modern culture is called "progress". It may not in the strict sense of the word always be progress, nevertheless, the changes in the different elements of our modern civilization are constantly occurring with varying speed. Perhaps the best present illustration of one of the more rapidly changing modern cultural elements is the way in which women's dresses, though all slavishly alike at any one time, change from season to season.

This principle of the gradual change of culture with the passage of time applies quite directly to the lives of the ancient Indians of Louisiana, and clear indications of it may be noted by a study of the articles they have left behind them.

By examining the sites of their prehistoric towns are found mounds, erected as part of the religious ceremonialism and which often served as cemeteries for the dead; remains of houses in which the people lived; and the midden deposits—the village garbage dumps—where broken pottery and worn out flint knives, arrowheads, axes, etc., were deposited. All of these man-made things were subject to the principle of constant change, hence those on any one site are *more or less* peculiar to the time that produced them.

It is apparent that if the different forms of the various implements, houses, mounds, etc., used during time covered by one of these ancient cultures can be arranged in the sequence in which they occurred, it is possible to determine the relative ages of the various old towns, not in the accurate terms of years but in relation to one another. The origins, migrations, developments and final disposition of the different groups of people by this means are made apparent. Thus the prehistory of the area is outlined. Such an arrangement of cultural elements, called a chronology, is one of the primary purposes of archaeological research. The simplest means of arranging such a chronology is to select some one element of culture which appears commonly on the ancient sites and which was subject to rapid change in form. After the chronology of this one element is discovered, it serves as a "yardstick" for the remaining elements of the culture history.

On prehistoric villages in Louisiana and neighboring southern states, the most common of the remaining elements of the old cultures, and fortunately one which appears to have been subject to fairly rapid change, is the pottery found in graves and in the village garbage heaps. As the chronology of this key culture element is easier to discover by working from the known back into

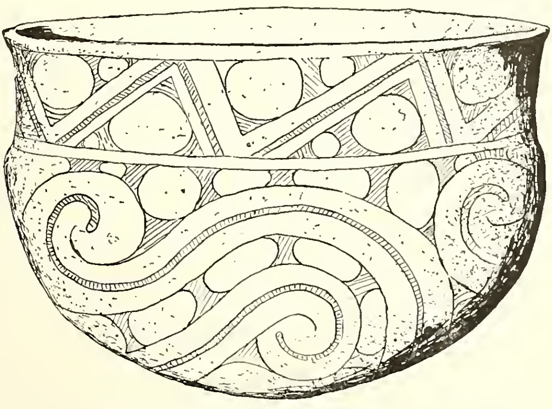


Fig. 1. A pottery vessel of the historic Caddo type from the "Fish Hatchery" site near Natchitoches, La.

the unknown past, the first task becomes that of discovering the types of pottery and pottery decorations used by the tribes that came in contact with the whites.

Several of the historic tribal pottery types have already been discovered. That of the Caddo Indians occupying the northwestern part of the state was definitely determined at the "Fish Hatchery" site near Natchitoches by Mr. Winslow Walker, of the Bureau of American Ethnology, in 1931. (See *Journal of the Washington Academy of Sciences*, Vol. XXIV, No. 2, Feb. 15, 1934, pps. 99-104.) This ware is characterized by incised lines which form elaborate scroll and meander designs and by a profuse use of spurs and delicate cross-hatching (Figure 1). This pottery is identified as historic by implements found accompanying it which were traded to the Indians by the Europeans.

Pottery characteristic of the Natchez tribe was discovered at a village near Natchez, Mississippi, by Mr. M. B. Chambers, of the Mississippi Department of Archives and History, in 1929. This ware was similar to, but not identical with, the Caddo. It is ornamented with graceful scrolls and meanders formed by bands of three lines (Figure 2). A definite date of 1720 is indicated for this pottery not only by the early descriptions of the Natchez villages, but by the quantity of French trade objects accompanying the finds.

Thus by identification of the historic pottery a basis is established for a chronology. Comparative studies show, however, that although the Caddo had occupied the territory where they were first described longer than had the Natchez, both cultures at comparatively recent times had displaced others which had entirely different pottery designs and which very likely represented an entirely different people.

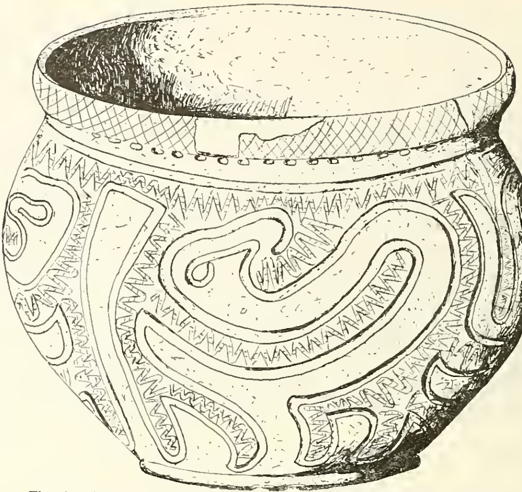


Fig. 3. A pottery vessel from the site at Marksville, La., typical of the "Hopewell" culture in the South.

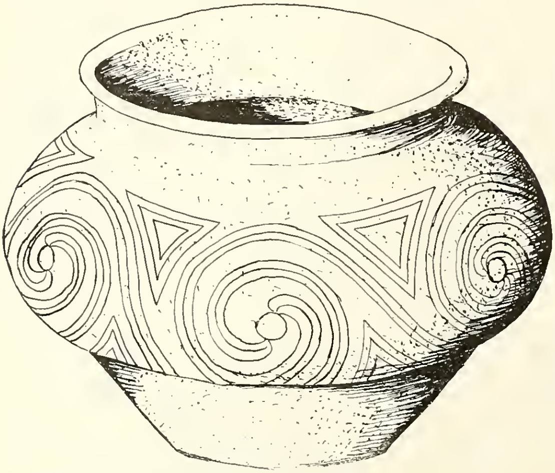


Fig. 2. Vessel used by Indians of the Natchez Tribe about 1720.

The people of this pre-Natchesan and Caddo pottery that disappeared before the historic period merely for convenience are called "Coles Creek" people. They appear to be descended, culturally at least, from a still older group of people known as "Hopewell".

Probably it is because of their relative antiquity that these "Hopewell" people are particularly interesting. At one time they occupied the entire valley of the Mississippi from Wisconsin to the mouth of the Mississippi River. All of this peculiar culture had disappeared, however, before the discovery of North America by the Europeans. "Hopewell" was discovered and named in 1908 in southern Ohio. There it appeared to be so different from and superior to the surrounding rather sombre cultures that it was decided connection must lie, as certain indications pointed, down the Mississippi Valley. At Marksville, Louisiana, a village site of this culture was discovered and excavated during the summer of 1933 by Mr. Frank Setzler of the United States National Museum. This excavation showed that the people living there during the time of the ancient "Hopewell" culture were agriculturists. They occupied square semi-subterranean houses in a village which was enclosed on three sides by earth embankments, probably surmounted by a wooden stockade, and on the fourth side by the steep bluffs bordering an old stream bed. Large rectangular earthworks strangely reminiscent of the stone pyramids of Central America were erected as sites for their ceremonial buildings. Some of the dead, probably officials of the group, were deposited in a large log-roofed vault buried beneath a conical mound twenty feet high. Copper from the Lake Superior region, galena from the mountains of Arkansas, conch shells from the Gulf of Mexico—all were brought to serve the needs of the people living in the old town near Marksville. Pottery smoking pipes of a typical platform or monitor design were in common use. The pottery was tastefully decorated with conventionalized birds and geometric figures formed by line-enclosed bands of rouletting (Figure 3).

Surface indications have identified a number of other villages of "Hopewell" age in both Mississippi and Louisiana. Although their relative antiquity is indicated by studies of cultural history, the significance of the peculiar fact of their frequent occurrence on oxbow lakes, old abandoned stream channels, is not yet understood.

This brief outline of part of Louisiana's prehistory has been determined within the past few years. It is still only partially substantiated. There are numerous points which are yet uncertain, and many more gaps remain to be filled in. No answer can yet be made to the primary questions: From where did these people come? Why? What happened to them?

Systematic archaeology in the southeastern states is yet in its infancy. The spectacular remains of southwestern America have occupied the attention of the competent investigators for the most part. Consequently the prehistory of that region is not only known in terms of culture periods, but through recent studies of the annual growth of tree rings, most of the sites can be given definite calendrical dates. However, during recent years, scientific research in archaeology of the southeast has taken great forward strides. Not only are the large national institutions becoming actively interested in the field, but several of the state universities have established museums and departments for systematic investigation and the teaching of prehistory.

Constructive field research is at present under way at a site on the south shore of Lake Pontchartrain. This project was initiated by the Louisiana Department of Conservation in January, 1934, and made possible through the Civil Works Administration of Louisiana. In September of 1934 the Department of Conservation transferred the supervision of the project to the School of Geology of Louisiana State University and such work is being made possible through the Emergency Relief Administration. It is hoped that a state-wide survey to locate and study the state's aboriginal remains in a systematic and thorough manner may be undertaken soon.

The conservation of Louisiana's prehistoric monuments is fast becoming a pressing question. Through cultivation, road-building, clearing with subsequent erosion and commercial "pot hunting", the Indian remains are fast disappearing. Although most of the civilized countries have regulations concerning the preservation of an-antiquities, there is none in America. However, many old town sites with their accompanying monuments have been set aside in most states by either the Federal or state governments for preservation as parks.

The research of the archaeologist is often compared with the reading of a book written in hieroglyphics. The scientific excavation of an old site is comparable to opening carefully and reading one of the musty pages. Careless or incompetent destruction of a mound or village site tears a page from the story that may never be replaced or read.

(Figures one and three sketched by permission of the United States National Museum.)

Pollution—The Nation's Shame

Seven minute address by Frank T. Bell, United States Commissioner of Fisheries, Washington, D. C., delivered from 12:42 to 12:49 p. m. Eastern Standard Time, on Friday, December 14, 1934, from WMAL, Washington, D. C., on the National Broadcasting Co.'s "Farm and Home Hour."

"I AM grateful to the National Broadcasting Co. for this opportunity of talking with my fellow Americans about a subject, which while not so pleasant, is nevertheless most vital to our common welfare, regardless of our walk in life. I want to speak very plainly and very frankly. When a condition prevails which threatens the health of our children and loved ones, we become immediately concerned, and then take steps to eradicate the condition, or shelter them from its contagion. We well remember the terrible epidemic of flu during the World War days, and the vigorous precautions we took in the home to protect our families. We went a step further. Our city, state and even Federal government came into the picture. We shall never forget the flu masks everyone was compelled to wear, schools were closed down, Governmental health agencies were taxed beyond capacity.

Today we are faced with another public menace, which strikes "home" to each of us. I refer to the nationwide problem of POLLUTION of our waters. Today many of our streams and waterways, which only a few years ago were defined as a flow of pure, healthgiving water, may be accurately described by the definition of pollution—physically unclean, contaminated, infected, impure, unsuitable for human consumption and not even fit for fish to live in.

As cloudy and dismal as this picture is, let us look at it sanely and sensibly for if man brought about this condition, surely man can correct it.

When the American population began to increase and our industrial life expand it was only a natural development that factories would be centralized along our water courses. Our growth was so rapid and our resources so plentiful that little thought was given to preserving our water supplies in their natural pure state. When communities were scattered and industries were small, the effects of stream pollution were usually of limited extent. Our streams carried away the household wastes, the sawdust and shavings from our lumber mills, the waste liquor from our tanneries, the scrubbings from our textile mills, the drainage from our mines, and once they were removed from immediate notice were soon forgotten. But today, the picture has changed entirely. Individuals and communities can no longer live to themselves alone, for domestic and industrial wastes are produced in such great volume that in many coastal and interior waters, their damaging effects are projected down stream through several states, and the problem of control, both from the point of view of public health and from the point of view of conservation of natural resources, becomes of national rather than local interest. This applies equally to sewage and industrial waste.

Just what conditions do we now find? One of our eastern cities alone dumps 95,000,000 gallons of human waste and sewage a day into one of our most beautiful, historical rivers. Another inland city throws 600 to 800 tons of raw garbage a day into one of our great rivers; one of our eastern states releases daily into its streams 3,000,000 pounds of concentrated sulfuric acid, one of the deadliest known poisons, with the result all fish life has been killed and its devastating effect is seen 500 miles down the river where all mussel life has been exterminated; another state, whose tributaries feed into the same river artery, deposits 5,000,000 pounds of this same deadly poison, with a result that the artery itself must carry 8,000,000 pounds daily where it is obvious no fish life can live; in one western state, 50 miles of the most picturesque mountain stream, which otherwise would be as beautiful a trout stream as could be found anywhere in the country, is entirely devoid of all fish or aquatic life because of mine wastes, and 6 lakes touched by this water are likewise barren of all life; two or three of our principal inland rivers on which several large cities depend for their drinking water supply have now been polluted to such an extent that by the existing methods of water purification, namely chlorine, it is barely possible to obtain water suitable for human consumption; and with the population growing, industries increasing, we have reached the very peak of reasonable safety; one of our own Bureau of Fisheries vessels, when tying up at one of our principal inland wharfs, has to attach a pipe to shore water, because the river water is not only unfit for use in washing one's hands, but is so vile that we do not dare pump the same through the engines.

I know these few examples may prove shocking, but we must face realities and consider the problem in the light of cold reason and scientific knowledge, without emotional appeal.

Now that we have arrived, so to speak, what are we going to do about it?

Control of streams is vested entirely in the States themselves and the only Federal jurisdiction is the War Department's authority to keep navigable waterways suitable for navigation purposes. This, in the common sense analysis, resolves itself down to the eradication of oil pollution, and it is obvious that oil pollution must become very flagrant before it seriously menaces water commerce.

We do not have to investigate very far to see quickly that control of pollution is an interstate problem, and if its dreaded advance is to be checked, for the well-being of our people, some interstate compact must be formed. Our commercial waterways cannot be kept free from contamination when the tributaries flowing into them from the several states are not protected from pollution. Similarly, it is of no use for one state to check the menace, when a state above it does nothing. Likewise, a very practical aspect of the condition grows out of our industrial approach. Unless all states are united, unfair competition in industries arises. Why should a state by creating laws prohibiting water contamination, lose industries who threaten to move to an adjoining state which permits them to dump acids, offal and other industrial waste into its streams.

No single national body has ever given adequate attention to the problem of stream pollution from the point of view of conservation. The National Health Service is concerned chiefly with the sanitary and health aspects of pollution; the War Department, alluded to, has interest only in navigational aspects; the Bureau of Standards has from time to time conducted research on reclaiming trade wastes in order to produce by-products; the Bureau of Mines has done excellent work in preventing stream pollution from mine wastes, but none of these activities goes far enough to safeguard either human or aquatic life.

Nationwide interest in this problem has been aroused. On December 6th Senator Augustine Lonergan of Connecticut, in conjunction with the Hon. D'Arcy Magee, of Washington, D. C., national vice-president of the Izaak Walton League, called federal officials having authority in water uses, along with the outstanding conservationists of this country, into conference with the Secretary of War, and there was launched a movement to coordinate the various governmental agencies both state and national in a war on pollution. In April of this year, it was my privilege to call the conservation commissioners from the various States into conference in St. Louis, and they formed themselves into the National Planning Council of Commercial and Game Fish Commissioners, who placed at the top of their agenda, "Purification of our streams". This coordinated Federal and State agency is committed to cooperation on this movement. The President's National Resources Board is giving its attention to the utilization of our water resources as a whole. The State planning boards are studying the problem, and with an aroused public opinion, and with industrialists, conservationists, state and Federal agencies working in close cooperation, we can conquer this noxious condition. Modern science has already shown the way. Many industrial waste products can be turned into profit. Many municipalities are taking advantage of the Government's liberal policy under Public Works Administration in assisting cities to build modern sewerage disposal plants. To the youth of the country, it is a recreational crisis and to all the rest of us an economic calamity threatening our social structure if we fail in protecting our water supplies.

Dr. Theobald Smith, President of the Rockefeller Institute for Medical Research, whose scientific discoveries have aided in curbing epidemics of typhoid fever, cholera, malaria and yellow fever, who died in New York on Monday of this week, has issued a challenge of self protection to all of us, in his timely admonition, "The American people must destroy pollution or pollution will destroy us."

Conservation of Louisiana's Mineral Resources, 1906 to 1935*

By

CYRIL K. MORESI, State Geologist,
Louisiana Department of Conservation

PART IV—1928 TO 1935

FAR reaching conservation policies transpired during this era. The transition was gradual for we begin with the year 1928, when the demand for Louisiana's mineral products was great and prices were high, then a period of general depression is experienced, resulting in fundamental readjustments, and finally, the period ends at the beginning of an intensive program of exploration and development of the State's mineral resources. This period is accompanied by a drastic change in policy and administration of state and federal government with relation to conservation.

Huey P. Long was inaugurated Governor of Louisiana in the spring of 1928 and upon taking office began to seek additional revenue for the public schools of Louisiana. Under his able leadership the Legislature of 1928 amended Sections 2, 3 and 5 of the severance tax law of 1922.[134] The amended measure[135] levied specific rates based on the quantity of the product severed from the soil and water, rather than on the value of the product severed. The following list includes only the rates of the different mineral resources

Interstate Natural Gas Company's booster plant at Cargas, La. (1928). This station builds up the pressure necessary to carry Monroe gas to Baton Rouge and points South.

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*These studies being so extended it was necessary to publish same in installments rather than in a single issue of the Louisiana Conservation Review. The first installment entitled, "Conservation of Louisiana's Mineral Resources, 1906 to 1918," Part I, is included in Vol. III, No. 3, July, 1933, issue of the Review. The second installment, Part II, is included in Vol. III, No. 4, October, 1933, issue. While the third installment appears in the Vol. IV, No. 4, October, 1934, and the date in the title was extended to the year 1934. The present issue contains Part IV, the final installment. This study will be revised and published along with all laws and regulations pertaining to minerals in a separate bulletin.

In order to eliminate repetition, the term "*operator*", as used in this study, includes all persons, firms, associations or corporations engaged in the business of exploring, exploiting, or severing raw mineral products from the soil or water.

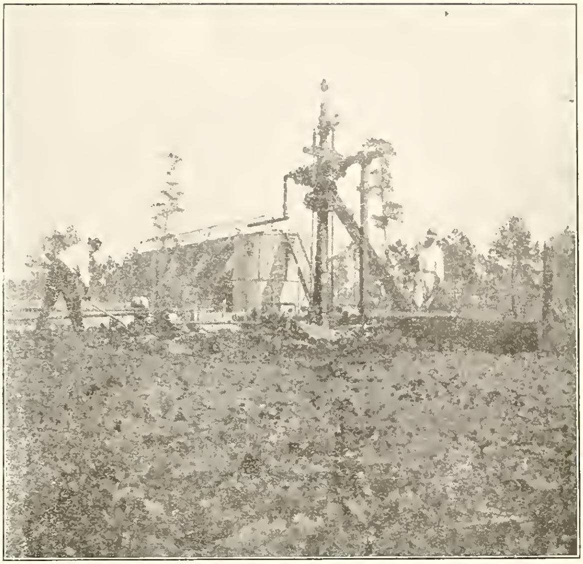
The author wishes especially to thank N. E. Simoneaux, Attorney and Associate Editor, Louisiana Conservation Review for his able assistance in the selection and interpretation of the legal questions regarding the Acts included in this study, and Dr. D. D. Daggett of Louisiana State University, for her kind interest and legal advice. To James P. Guillot, Secretary and James Nelson Gowanloch, Chief Biologist, Department of Conservation, for their assistance in the final preparation of this study, the writer wishes to express his gratitude.

[134] *Acts* of La., No. 140, 1922.

[135] *Acts* of La., No. 5, 1928.

severed. However, the Act included all natural resources severed from the soil or water. The following rates were levied on crude petroleum severed from the soil: Four (4) cents per (42 gallon) barrel on 28 gravity and below; four and one-half (4½) cents per barrel, gravity range from 28 to 31; five (5) cents per barrel gravity range from 31 to 32; eight (8) cents per barrel, gravity range from 32 to 36; ten (10) cents per barrel, gravity range from 36 to 43; eleven (11) cents per barrel on 43 gravity and above. One-fifth (1/5) of one (1) cent per thousand cubic feet on natural gas, measure at ten (10) ounce pressure. Fifteen (15) cents per ton (2000 lbs.) on sulphur. One and one-half (1½) cents per ton (2000 lbs.) on stone. One (1) cent per ton (2000 lbs.) on sand. One and one-half (1½) cents per ton (2000 lbs.) on shells. One and one-half (1½) cents per ton (2000 lbs.) on gravel; four (4) cents per ton (2000 lbs.) on salt. Other minerals such as coal, lignite, ores and marble were included, but these minerals were not being produced in Louisiana. The levying of a specific rate on the quantity of the product severed carried out the recommendations which the Supervisor of Public Accounts had been propounding for some four years. This Act directed the sheriffs and tax collectors of the several parishes wherein the product was severed, to collect these taxes and pay same to the State Treasury as collected. The State Auditor and Treasurer were directed to credit this tax to a special fund, known as the Severence Tax Fund. One-fifth (1/5) of the tax was allocated to the parish in which such product or products were severed, providing such sum did not exceed $200,000.00 in any one year. Each operator was required to file with the Supervisor of Public Accounts, thirty days after the expiration of each quarter annual, a statement showing the nature and quantity of the product severed.

Immediately after this severence tax law became effective (August 1, 1928) several oil operators attacked the measure contending that the severence tax on crude petroleum graduated according to gravity was arbitrary and therefore unconstitutional. In a test case, however, gravity as a basis for classification of the tax was upheld by the United States Supreme Court.[136] In the meantime the operators were required to pay tax under the provisions of the previous severance tax law (Act 140 of 1922) and to furnish bond covering the difference of the amount between the two severance taxes.



R. L. Gay, Sabine Lumber Co., No. 1, discovery well, Zwolle field, Sabine Parish, Louisiana. Initial production 4,000 barrels (1929).

A privilege tax was enacted by the Legislature of 1928 which levied a tax on manufacture of carbon black.[137] The measure defined the term "carbon black", as any kind of carbon black or gas carbon, gas graphite, or any form of carbon produced from natural gas. The tax was graduated and based on the quantity of carbon black produced. The tax rate being five-tenths (5/10) of one (1) cent per pound. Any producer could pay the tax based on one (1) cent per each 1000 cubic feet of gas consumed instead of paying the tax based on the number of pounds of carbon black produced, provided that each 1000 cubic feet of natural gas consumed would produce more than three (3) pounds of carbon black. The tax was collected by the sheriffs and tax collectors of the various parishes, transmitted to the State Treasurer monthly and credited to the Severance Tax Fund. The operators were required to submit to the Supervisor of Public Accounts at the end of each quarter-annual a report showing their production for that period.

On February 6, 1929, Robert S. Maestri was appointed Commissioner of Conservation. The incumbent V. K. Irion, refused to surrender the office after the expiration of his term, which necessitated a long and unpleasant litigation. The services the Department was rendering suffered much in the interim occupied by these long tedious legal proceedings and delayed enforcement of the laws. On December 12, 1929, the Louisiana Supreme Court formally declared Commissioner Maestri legally and equitably entitled to the office and commanded V. K. Irion to surrender and vacate the office.[138] Commissioner Maestri, immediately after taking office, began a program of retrenchment and strict economy in the disbursement of the revenues of the Department. A complete inventory of all property belonging to the Department and a thorough check and audit of the books and records were made. Each Division was completely reorganized and Commissioner Maestri surrounded himself with a new cabinet so that the policies of his Administration could be more harmoniously brought into effect and meet the requirements in a more effective and comprehensive method. The Department was organized under nine distinct divisions of activity. A division of Statistical Biological Research and Information was created but because of the then existing financial conditions of the Department did not become fully active until March, 1931.

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[136] "In laying a graduated specific severence tax per barrel on oils sold primarily for their gasoline content, resort to Baumé gravity as the basis of classification cannot be regarded as palpably arbitrary, it appearing, as generally regarded in the industry as indicative of gasoline content and is used by the industry, including the complaining tax payer in fixing the prices of such oils." *Ohio Oil Company v. Conway, Supervisor of Public Accounts of Louisiana*, 281 U. S. 146.

[137] *Acts* of La., No. 152, 1928, p. 207.

The Division of Minerals, because of the serious responsibility involved in the supervision of all operations of oil and gas fields and other mineral industries of the State, continued to be the most important branch of the Department. The work of this Division was entirely technical and, therefore, necessitated a more skilled and conscientious staff of petroleum engineers and geologists. The head office of the Division of Minerals remained in Shreveport, with branch offices at Monroe and Lake Charles. The Commissioner realized the necessity of a branch office located in the southeastern portion of the State. However, this branch office was not established until some three years later. Commissioner Maestri concurred with the previous Commissioners in recommending that a "statewide geological survey be instituted at the earliest possible moment."[139]

In the latter part of 1928, the number of drilling permits issued by the Division of Minerals began increasing steadily and some 931 permits to drill were issued the following year—an increase of 258 from 1928.

Prospects of developing the mineral resources of Louisiana appeared very encouraging at the close of 1929 but the generally depressed condition of the country retarded this development for some three years. The daily average production of crude petroleum in Louisiana was approximately 60,000 barrels in 1929. This quantity was somewhat less than the previous years because of the enormous production in California, Oklahoma, and Texas. The total quantity of crude petroleum produced in the United States amounted to 1,005,598,000 barrels in 1927. Louisiana produced 22,018,013 barrels of oil in 1928 and 20,619,978 barrels in 1929. While the total production of oil in North Louisiana decreased, the production in South Louisiana steadily increased, thus maintaining the total production of the State above twenty million barrels a year. In 1929, oil was discovered in Zwolle oil field, Sabine Parish. This field was the most important oil field discovered in North Louisiana since the Haynesville area was proven in 1921.[140]

While Louisiana's output of crude petroleum continued to decline slightly, the production of natural gas continued to increase by leaps and bounds. Louisiana held fourth position among the 10 largest gas producing states of the Union. In 1928, Louisiana produced 232,820,359,472 cubic feet of gas—an increase of 28 per cent from the previous year. The total production for 1929 increased 12 per cent over the record year, 1928. During the two-year period, 1928-1929, some 533 producing gas wells, with a total open flow capacity of approximately 8,129,548,000 cubic feet, were completed. The rapid growth which the natural gas industry experienced in Louisiana was due principally to the tremendous expansion of the pipe line systems from North Louisiana to South Louisiana, Mississippi, Alabama, Georgia, Tennessee, and Southeast Texas.[141]

Louisiana continued to be the largest producer of carbon black. In 1928, this State accounted for 55 per cent of the total quantity produced in the United States. During this year, Louisiana produced 137,314,120 pounds of carbon black from 99,700,121,000 cubic feet of natural gas. The three salt mines of Iberia Parish produced a total of 630,780 short tons of salt in 1928. Limestone from the Winnfield salt dome, Winn Parish, was being quarried and crushed. In 1928, some 126,506 tons of stone and 4,415 tons of sand or rock dust was produced.[142] During this year, 839,639 tons of shells, 1,563,903 tons of gravel, and 371,107 tons of sand were severed in Louisiana.

The sum of $1,157,965.65 was received by the Supervisor of Public Accounts from the severance tax on minerals in 1928. The sum of $1,549,017.25, was derived from this tax in 1929.[143]

The privilege tax on carbon black amounted to

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[138] *Saint v. Irion*, 165 La.

[139] Ninth Biennial Report, *La. Dept. Consv.*, 1928-1929, p. 21.

[140] *Ibid.*, pp. 140 ff.

[141] *Ibid.*, p. 174.

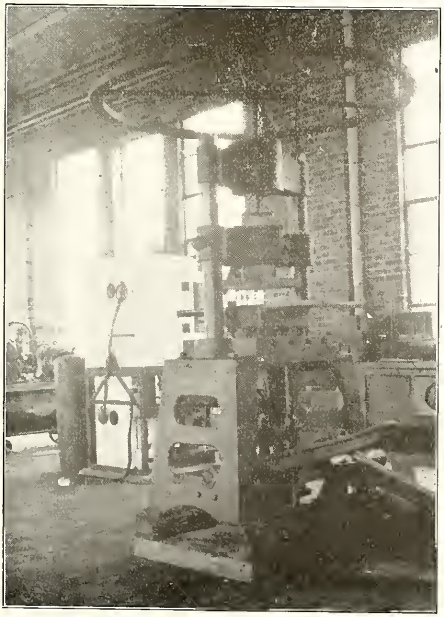
[142] *Ibid.*, p. 181.

[143] *Report of Supervisor of Public Accounts*, 1930, p. 116, p. 238.

View of oil wells located on the East Hackberry salt dome, Cameron Parish. Portion of the field underlies Calcasieu Lake (1929).

$100,961.13 for the last five months of 1928 as the tax did not become effective until August, 1928. During 1929, the sum of $576,123.69 was derived from this tax.[144]

Cash bonuses and royalties from mineral leases on State lands during the years 1928 and 1929 increased tremendously. From January 1, 1928 to January 1, 1930, the sum of $1,557,226.28 was received by the State Land Office; this sum more than doubled the sum received during the last two year period. The Register reported that "56 new leases [were] recorded during the period. All leases under this act [Act 30 of 1915] are made after due advertisement and to the highest bidder, the Governor reserving the right to reject any and all bids. This right has been exercised in several instances where it appeared that the bids were not large enough to warrant the State entering into a lease. During the period, the State made three leases on which the high bids were one hundred thousand dollars ($100,000.00) or over".[145] In 1930 they were twelve state leases from which petroleum was being produced; four in Caddo Parish; one in the Urania field; one in the Lockport field; Calcasieu Parish; two in the East Hackberry field, Cameron Parish; one in the Bayou Bouillon field, St. Martin Parish; and one each in the Dog Lake, Lake Barre, and Lake Pelto fields, Terrebonne Parish.



Hand press for moulding brick and test pieces by the dry press method used by the cooperative clay survey of Louisiana State University and the Department of Conservation (1928).

The Register stated further that, "the Oil Companies have been and are still spending hundreds of thousands of dollars in the State, much of which helps the State directly, but a great deal more of which helps indirectly by providing work for abstracting concerns, cases for attorneys and labor for the local citizens. Several of the larger companies keep seismographing crews in the fields continually . . ."[146]

In 1929, Dr. J. A. Shaw, succeeded William P. Chisholm as Director of the Division of Minerals, and he reported that the "oil and gas producers have recognized the necessity of strict enforcement and compliance in all the Conservation measures . . ."[147] He reported further that at the end of 1928, the clay survey had drilled 3,225 test holes, and collected 3,045 clay samples and tested 4,025 clay samples.

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[144] *Ibid.*, p. 117, p. 239.

[145] Biennial Report, *Register, State Land Office*, May, 1930, p. 7.

[146] *Ibid.*, p. 7.

[147] Ninth Biennial Report, *La. Dept. Consv.*, 1928-1929, p. 179.

Because of numerous complaints of stream pollution as a result of wastes from oil fields, paper mills, and refineries for some years, the Division of Minerals established a chemical laboratory at the Shreveport office in 1929, for the purpose of analyzing waste waters and mineral waters of the State.

The Division of Minerals received $88,845.54 and the expenditures amounted to $94,592.09 in 1928. The following year the Division received $128,149.01 and expended the sum of $114,613.22.[148]

One of the outstanding accomplishments during the third era was the enactment of legislation in 1930, sponsored by the Department, providing for the establishment within the Department of a Bureau of Scientific Research and Statistics.[149] This Act directed the Commissioner to establish a Bureau to study and compile scientific data concerning the wild life of the air, water and land, and the mineral resources of the State.[150] Although the special funds provided under the Act were not available, the Commissioner created a preliminary scientific organization to cooperate with the United States Bureau of Fisheries in making a survey of the shrimp industry in the State.[151]

To carry out further the provisions of this Act, Commissioner Maestri inaugurated a survey to make a thorough geological study of each parish in the State of Louisiana as far as funds would permit. The Louisiana Geological Survey was abandoned in 1909 and since that time very little information regarding the geology and mineral resources of the State had been published in such form as to be generally available. During these twenty-two years numerous operators explored and exploited the mineral resources of Louisiana and some of their discoveries had been recorded in various professional papers. The first problem which confronted the newly organized survey was the compilation of this material, along with more recent discoveries, and of publishing this information as a series of Bulletins.

Commissioner Maestri appointed Cyril K. Moresi to the position of Geologist of the Bureau of Scientific Research and Statistics, Minerals Section, and detailed him to work with Dr. Henry V. Howe, Director of the School of Geology of Louisiana State University in making a geological survey of the State. Dr. Howe began at once with Mr. Moresi in the preparation of a geologic report of the parish of Iberia. This Parish was selected as the subject of the first report because of its vast minerals resources and its important position in the salt dome literature of the world.[152]

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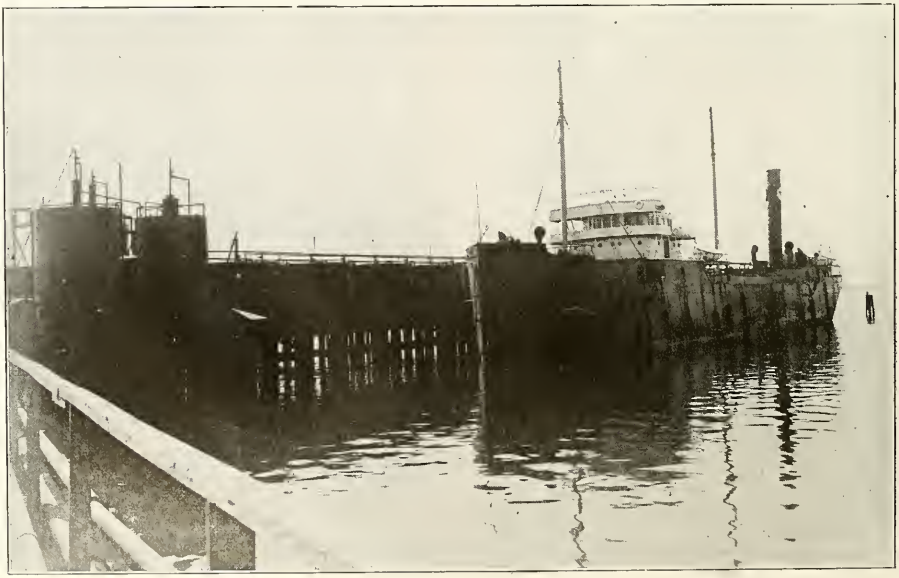
[148] *Ibid.*, p. 247.

[149] *Acts* of La., No. 45, 1930.

[150] *Idem.*

[151] Tenth Biennial Report, *La. Dept. Consv.*, 1930-1931, p. 20.

[152] Eleventh Biennial Report, *La. Dept. Consv.*, 1932-1933, p. 113.



The Texas Company's Ship "Louisiana" and storage tanks in the Lake Barre oil field, Terrebonne Parish.

Geological Bulletin No. 1, entitled "Geology of Iberia Parish", was published by the Department of Conservation in November, 1931. Immediately after the completion of this report Mr. Moresi began a geological survey of the parishes of Lafayette and St. Martin and Dr. Howe assisted by Mr. W. E. Wallace began the preparation of a study dealing with foraminifera of the Jackson Eocene.

The initiation of this survey was one of the most important advancements by the Department to develop and make known the mineral resources of Louisiana. During this period South Louisiana experienced the discovery of five oil fields and two large sulphur deposits. It is well to note that these areas became important during the following three years. North Louisiana did not experience any important discoveries during the years 1930-1931. In 1930, Louisiana produced a total 22,983,131 barrels of crude petroleum, of which quantity, South Louisiana produced 8,684,597 barrels while North Louisiana accounted for 14,298,534 barrels. The following year the production for North Louisiana decreased to 11,964,015 barrels while South Louisiana's output increased to 9,610,804 barrels. The total production of crude petroleum in Louisiana during the year 1931 amounted to 21,574,819 barrels—a slight decrease from that of the previous year.[153]

During the year 1930 the number of drilling permits issued by the Department of Conservation established a new record. A total of 948 drilling permits was issued during 1930. The following year the number of permits issued decreased to an exceptionally low mark—amounting to 330. The large number of permits issued in 1930 was due to the extensive drilling campaign on the eastern flank of the Sabine Uplift with the hope of discovering a field in Louisiana similar to the East Texas oil field. Since no important discoveries were made in North Louisiana during 1930 and because of the low price of crude petroleum at the beginning of 1931, due to overproduction, this program of wildcatting was discontinued in Louisiana to a large extent. Also during this period of extremely low priced crude, hundreds of stripper wells were abandoned. During the latter part of 1931, the price of crude petroleum increased slightly which lessened the desire of more of these small producers to abandon their wells.[154]

Five geophysically discovered salt domes in South Louisiana, from which commercial production of oil was obtained during this biennial period, are listed as follows: Caillou Island field, Terrebonne Parish, 1930; Iowa field, Calcasieu-Jeff. Davis Parish, 1931; Cameron Meadows field, Cameron Parish, 1931; Choctaw field, Iberville Parish, 1931; Leeville field, Lafourche Par-

View of the Caillou oil field, Terrebonne Parish, showing the producing wells and the ship "Tampico" which is used to store the oil (1933).

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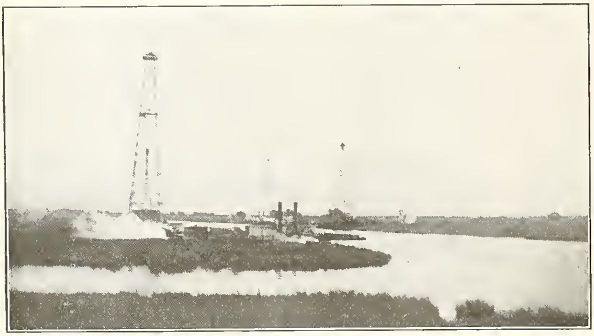
[153] Tenth Biennial Report, *La. Dept. Consv.*, 1930-1931, p. 434.

[154] *Ibid.*, p. 401.



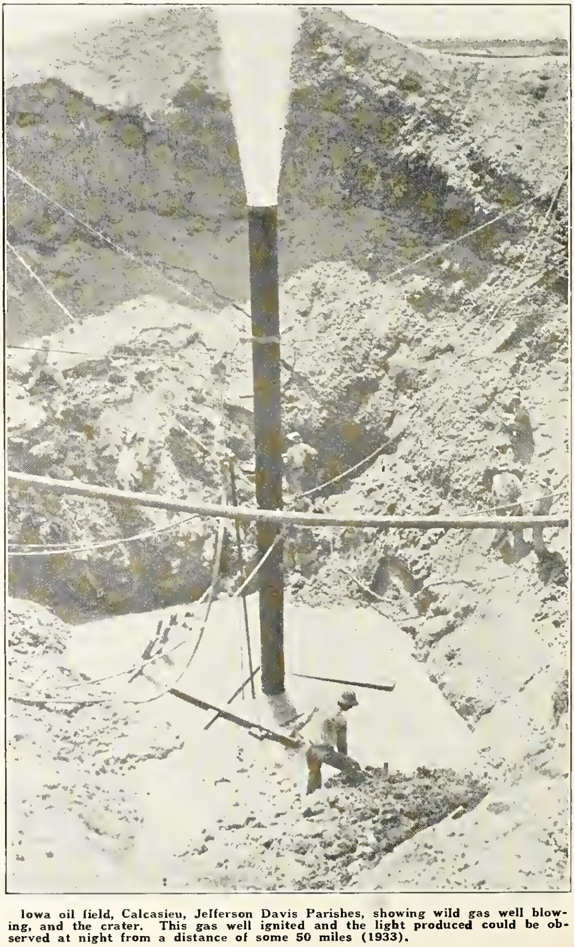
Leeville oil field, Lafourche Parish. Derricks shown on both sides of Bayou Lafourche (1933).

ish, 1931; and the Grande Ecaille field, Plaquemines Parish, 1931. During the following three years these fields were listed among the most important producers in South Louisiana.

Louisiana's natural gas production reached its peak in 1930. During that year 266,380,180,000 cubic feet of gas were produced. The following year the production decreased to 222,471,691,000 cubic feet. This decline was the result of the decrease in the demand for natural gas also the result of the order issued by the Division of Minerals requiring reduction of back pressure on all wells in the Monroe gas field with rock pressure lower than 300 pounds. The carbon black industry's consumption of natural gas decreased greatly due to regulations imposed on this industry by the Legislature.[155] Because of these recent regulations and because of the increased use of natural gas for domestic and industrial purposes the price of natural gas began increasing. Natural gas was being produced from twenty-four separate gas producing fields at the end of 1931.[156]

During this period several gas lines to distant points were completed. These lines were transporting natural gas to Houston, Beaumont, Dallas, and Fort Worth, Texas; El Dorado and Camden, Arkansas; Memphis, Tennessee; St. Louis, Missouri; Atlanta, Georgia; and New Orleans. A gas line from the Monroe-Richland gas field to most of the towns and cities of South Louisiana was under construction.

The production of carbon black in Louisiana continued to decline. Carbon black was first produced in Louisiana in 1919, when 14,024,606 pounds were manufactured. This volume increased annually until 1928, when 137,314,120 pounds were manufactured. From that year, the production decreased and in 1931 only 47,773,803 pounds were manufactured. As a considerable portion of the carbon black manufactured from Louisiana's natural gas is used in the manufacture of automobile tires and other rubber products



Iowa oil field, Calcasieu, Jefferson Davis Parishes, showing wild gas well blowing, and the crater. This gas well ignited and the light produced could be observed at night from a distance of some 50 miles (1933).

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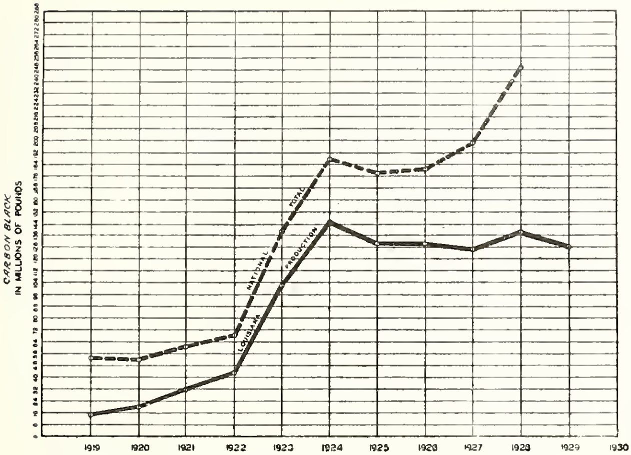
[155] *Acts* of La., No. 252, 1924.

[156] Tenth Biennial Report, *La. Dept. Consv.*, 1930-1931, p. 421.



Graph showing the quantity of carbon black produced in Louisiana and in the United States yearly, from 1919 to 1929.

there resulted, due to the generally depressed conditions of the country, and the correspondingly decreased demand for automobile tires and other rubber products, a largely decreased demand for carbon black during this period.[157]

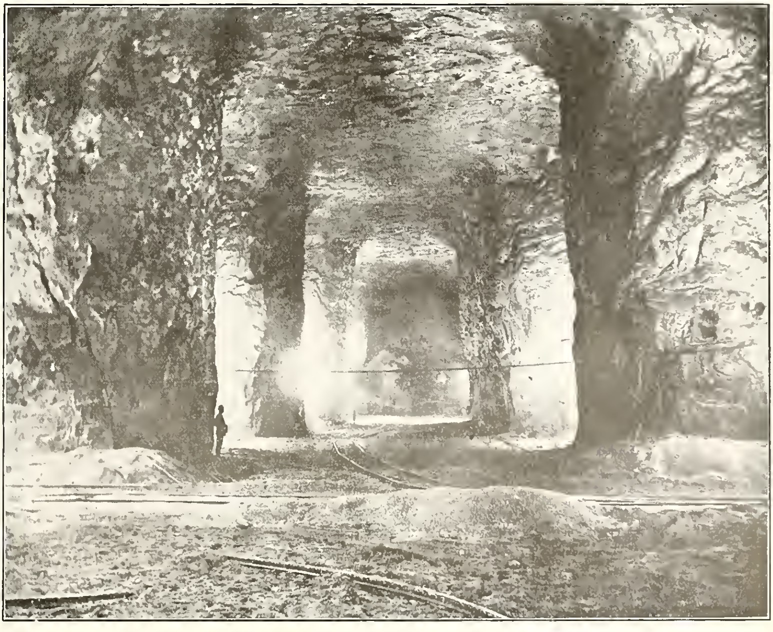
In 1930 a total of 536,434 tons of salt was produced from the three salt mines of Iberia Parish. The following year 510,000 tons were produced.[158]

The most important development in the mineral industry of the State during this period was the discovery of sulphur in the caprock of Jefferson Island salt dome, Iberia Parish. It is interesting to note that Louisiana was the first State in the Union in which elemental sulphur was produced. Sulphur was first produced commercially in 1905, from the Sulphur salt dome, Calcasieu Parish. From that year (1905) to the year 1925, some 9,500,000 tons of sulphur were produced from this dome. Later, oil was obtained in commercial quantities from the flanks of this salt dome.

Exploration of the sulphur deposit on the Jefferson Island salt dome and the erection of a plant to produce the sulphur were moving at a rapid state at the close of 1931. Salt was being mined from the southeast portion of the dome.

Enlargement of the limestone quarry of the Winnfield salt dome for the mining and crushing of limestone to be used as road material and the erection of a plant for the mining and refining of salt created additional interest.

As a result of the extensive highway program initiated by Governor Long in 1929, the total production of shells, gravel and sand in Louisiana increased tremendously during 1930. In 1930, a total of 968,685 tons of shells, 2,589,414 tons of gravel, and 1,412,961 tons of sand was obtained from deposits in Louisiana.[159] Approxi-



Interior view Avery Island salt mine, near New Iberia, Louisiana (1930).

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[157] *Ibid.*, p. 446.

[158] *Ibid.*, p. 453.

[159] *Report of the Supervisor of Public Accounts*, 1932, p. 118.

mately the same quantities were produced the following year.

As a result of an increase in the production of the mineral resources of Louisiana and as a result of the increased severance tax rate on these mineral resources the revenue received by the State increased tremendously in 1930. During this year $2,201,533.77 was received from those severing minerals from the soil and water. This revenue increased nearly one million dollars from that of the previous year. The following year the sum of $2,016,364.26 was collected.[160]

The production of carbon black in Louisiana continued to decline. During 1930 the sum of $505,383.45 was derived from the privilege tax on the manufacture of carbon black. The following year this revenue decreased to $267,102.12.[161] Temporary injunctions against the Supervisor of Public Accounts were granted by the Federal Courts to prevent the collection of this tax as a number of carbon black manufacturers attacked the constitutionality of the Act.[162]

Because of the generally depressed condition of the country and because of the tremendous overproduction of crude petroleum the exploration of the minerals resources and particularly of the petroleum resources of the State decreased tremendously during the biennial period 1930-1931. This condition seriously affected the revenues derived from these sources by the State Land Office. During this period only fourteen new leases were made and sixty-eight leases which were made during previous years were relinquished or cancelled for the failure to pay rentals. However, the production of petroleum on the State leases continued to increase but due to the low price of crude oil the amount of revenue received by the State Land Office was less than that of the preceding biennial period. The sum of $586,602.35 was received by the State Land Office in cash bonuses and royalties from mineral leases. This amount decreased nearly one million dollars from that received during the preceding biennial period.[162a]

The Division of Minerals continued to extend the service. In 1931 the chemical laboratory of the Division in Shreveport was enlarged so as to include the necessary equipment for paleontological work. A competent paleontologist, familiar with general chemical and analytical problems was employed for this Division.

Commissioner Maestri reported that a number of abuses had been corrected during the biennial period 1930-1931. The operators had been called upon to account in full for all gas, bought, sold or exchanged. "Line loss", a term used to cover any amount of gas taken, which operators did not care to report and which amounted to a tremendous volume, was eliminated. The Department's forms were revised so as to ensure that the operator account for practically all gas handled

Winnfield quarry, Winn Parish, where limestone from the cap-rock of the Winnfield salt dome is mined and crushed for road material (1930).

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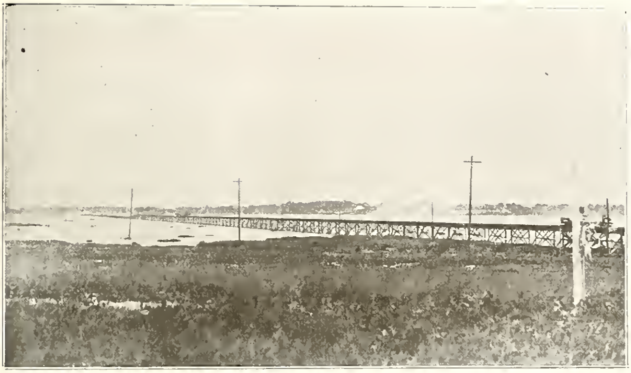
[160] *Ibid.*, p. 118, p. 236.

[161] *Ibid.*, p. 235.

[162] *Acts* of La., No. 152, 1928.

[162a] Biennial Report, *Register, State Land Office*, May, 1932, pp. 5 ff.



Trestle over Lake Peigneur, supporting steam, water, air, and sulphur pipes between power plant and sulphur wells of the Jefferson Lake Oil Co., Inc. (1932).

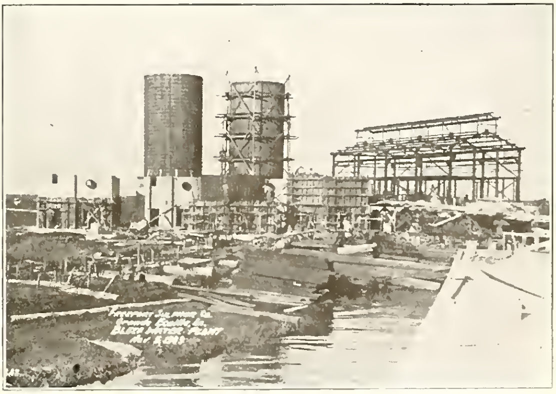
from the time of leaving the well, until it is finally burned into carbon, or goes into the high pressure transmission lines. All operators were required to report all volumes of gas under standard pressure base of 14.4 pounds. The Minerals Division during 1930-1931, extinguished three gigantic craters which had been consuming millions of cubic feet of natural gas daily for years.[163]

The Director of the Division of Minerals reported that, "much attention has been given to the fraudulent production and metering of natural gas, particularly in the Monroe and Richland gas field."[164] The disposal of oil field brines or "bleed water" and of the waste waters from pulp mills and oil refineries into the streams and water bodies of the State was the most important problem which confronted the Department at that time.

During the year 1930, the Division of Minerals received an appropriation of $99,999.97 from the State and the sum of $26,875.56 from various map fees and reimbursements. During this year a total of $123,184.50 was expended by the Division. The following year the Division received an appropriation of $100,000.00 and expended the sum of $102,820.00.[165] Because of the anticipated production of salt in solution form and because the severance tax law of 1928 and previous severance tax laws regarding salt referred to the severing of rock salt, it became necessary to impose a severance tax on salt extracted or produced in solution which was used in the manufacture of other products and not marketed as salt. The Legislature of 1932 enacted a measure[166] levying a severance tax of one-half (½) cent per ton (2000 lbs.) on salt produced or extracted as brine in solution form from the soil or water, when such salt was used in the manufacture of other products and not marketed as salt. The tax was collected and supervised in the same manner as specified by the severance tax law of 1928. This measure did not affect the severance tax on salt when the salt was severed from the soil as a solid as fixed by the previous severance tax laws.[167]

This legislature increased the severance tax on sulphur severed from the soil from fifteen (15) cents per ton (2000 lbs.) to twenty-seven (27) cents per ton (2240 lbs.).[168] One-third (1/3) of this tax was to be credited to the parish in which this product was severed and the balance credited to the Severance Tax Fund. The tax was to be collected and supervised in the same manner as the severance tax on oil, gas and other minerals severed from the soil or water.

As a result of the pollution of streams and particularly of the large bodies of water of South Louisiana, a measure was enacted by the Legislature of 1932 to conserve and protect fish and all other aquatic life of commercial or economic value existing in Louisiana. This Act[169] deemed it a misdemeanor, subject to fine of not less than $10 nor more than $100 or not less than ten days nor more



View of the construction of plant designed to render harmless the effluent bleed water from the sulphur mine of the Freeport Sulphur Company at Grande Ecaille, Louisiana (1933).

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[163] Tenth Biennial Report, *La. Dept. Consv.*, 1930-1931, p. 19.

[164] *Ibid.*, p. 477.

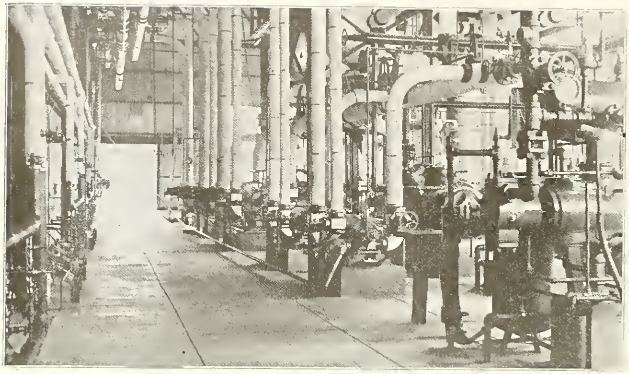
[165] *Ibid.*, pp. 172 ff.

[166] *Acts* of La., No. 72, 1932, p. 325.

[167] *Acts* of La., No. 140, 1922; No. 5, 1928.

[168] *Acts* of La., No. 163, 1932, p. 527.

[169] *Acts* of La., No. 68, 1932.



Interior view of power plant of the Jefferson Lake Oil Company's sulphur mine, showing water and steam pumps (1932).
—Courtesy, Jefferson Lake Oil Company, Inc.

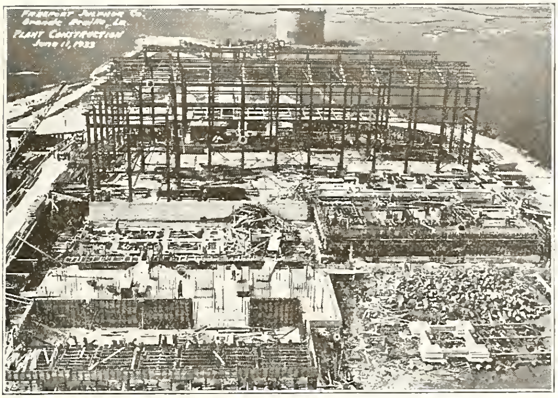
than 60 days or liable to both, for any operator to cause the natural condition of any water body to be modified and make same detrimental to the interest of the State to discharge or permit to be discharged any substance into the water, or make the water unfit for the maintenance of normal fish life. Each separate day upon which such a violation occurs, constituted a separate offense. This Act also deemed it a misdemeanor for any person to use explosives in any of the waters of the State, and carried a penalty of imprisonment in the parish jail of not less than sixty (60) days nor more than twelve (12) months; the term of imprisonment left to the discretion of the Court.

As early as 1927, the Department made a practice of requiring geophysical operators, who dynamited in State water, to secure a permit to do such work and have a Conservation Agent present while such operations were being carried on. This regulation has been in effect since 1927, and is also in existence at the present time. These permits may be revoked by the Commissioner of Conservation at any time. This particular regulation has been so well administered during recent years, that the mortality of fish and other wild life has been negligible.

Exploitation in the mineral industry of Louisiana was rather active during 1932 in spite of the depressed condition of the country. During that year another oil field, the Gueydan oil field, Vermilion Parish, was discovered, and the production of sulphur on a commercial basis was begun on the Jefferson Island salt dome, Iberia Parish. It is interesting to note that elemental sulphur was first produced on this continent from the Sulphur salt dome, Calcasieu Parish in 1903. This mine was abandoned in 1924, after having produced some 9,500,000 tons of sulphur.

Despite the declining economic condition which prevailed at that time, and reached its low ebb in March, 1933, Louisiana was one of the four states of the Union whose production of crude petroleum for 1933 was greater than that for 1932. In the latter part of 1933, activity in the exploration, exploitation, and development of the mineral resources of Louisiana, and particularly those of South Louisiana, began increasing at a rapid rate. In November, 1933, the National Recovery Administration began prorating the several states in which petroleum was produced, thus stabilizing the petroleum market and increasing the price of crude petroleum. The rise in the price of crude petroleum and the fact that very few deep wells had been drilled in South Louisiana previous to this time, resulted in the exploration of the deeper horizons by a large number of operators. As a result of this exploration a number of prolific oil fields were discovered and production from the deeper horizons of some of the older fields increased the total daily production of oil in South Louisiana tremendously during 1933. The discovery of another oil field in Sabine Parish, the Converse field, created much interest in the oil industry in the northwest part of the State. In addition to the oil fields discovered in Louisiana,

Locomotive crane loading sulphur at the Jefferson Lake Oil Company's plant (1932).
—Courtesy, Jefferson Lake Oil Company, Inc.



View of the construction of power plant for the Freeport Sulphur Company's sulphur mine on the Grande Ecaille dome. Plaquemines Parish (1933).

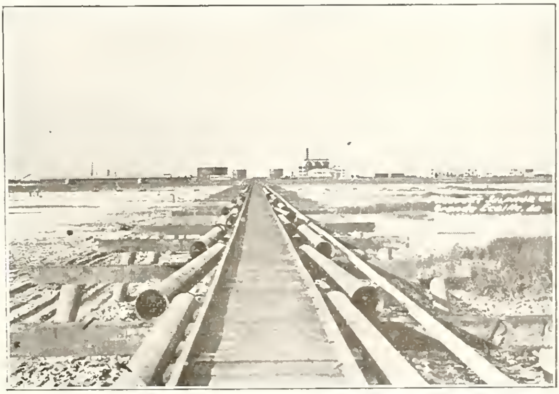
a number of salt domes were discovered during this year. In 1932, the Department of Conservation issued 598 permits to operators to drill for minerals. Due to the increased activity in the petroleum and sulphur industries of South Louisiana, a total of 822 permits was issued the following year.

The production of crude petroleum in Louisiana amounted to 20,018,185 barrels for the year 1932. Of this quantity, South Louisiana accounted for 11,167,260, while production of North Louisiana decreased to 9,849,925 barrels. The production of crude oil in South Louisiana had been increasing for years, while North Louisiana's production had been gradually declining. The year 1932 was the first year in which South Louisiana's total production exceeded that of North Louisiana. The following year the production of crude petroleum in Louisiana increased to 25,502,881 barrels. This increase was due to the tremendous increased production in South Louisiana inasmuch as North Louisiana's production continued to decline.[170]

Although Louisiana's natural gas production continued to decline slightly after the peak year 1930, this State ranked fourth among the gas producing states in total quantity of gas produced for the year 1932. During this year, Louisiana produced 198,695,157,000 cubic feet of gas. In 1933, the production amounted to 193,202,645,000 cubic feet. The decline was caused by a generally decreased demand for natural gas for making carbon black, as the commercial and domestic consumption continued to increase. The total number of interstate movements increased in 1932, but the total quantity of gas transported from the State declined slightly. Louisiana ranked fifth in interstate shipments. In addition to the Northeast Louisiana gas field, which includes the Monroe, Richland, and the East and West Carroll fields, there are twenty-two distinct gas producing districts located in northwest Louisiana.

The production of carbon black in Louisiana continued to decline. This industry migrated to Louisiana in 1920 to take advantage of the large supply of available gas in the Monroe gas field. Then came the discovery of large quantities of natural gas in Texas, which attracted this industry into that State. In 1932, some 42,897,501 pounds of carbon black were manufactured from 39,696,574,000 cubic feet of natural gas. This amount increased to 54,566,416 pounds in 1933.[171]

At the close of 1933, Louisiana had two sulphur mines producing elemental sulphur commercially. From the year 1924, when the sulphur mine on the Sulphur salt dome was abandoned (after producing nine and one-half million tons of sulphur), until October, 1932, when the sulphur mine on the Jefferson Island salt dome began producing, no sulphur was produced in Louisiana but elemental sulphur was being produced from a number of salt domes in the Gulf Coast region of Texas during these eight years. In December, 1933, the sulphur mine on the Grande Ecaille salt dome, Plaquemines Parish, began producing sulphur



Trestle supporting steam, water, air, and sulphur pipe line from the power plant to sulphur wells of the Freeport Sulphur Company's plant at Grande Ecaille, Louisiana (1933).

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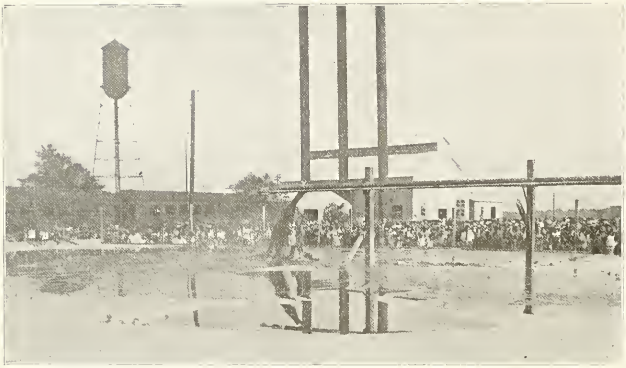
[170] Eleventh Biennial Report, *La. Dept. Consv.*, 1932-1933, pp. 410 ff.

[171] *Ibid.*, p. 421.



Molten sulphur flowing into the vat—Jefferson Lake Oil Company's plant (1932).
—Courtesy, Jefferson Lake Oil Company, Inc.

commercially. In 1932, a total of 13,401 long tons of sulphur was produced while the production for 1933 increased to 303,787 tons.

Louisiana ranked third in the total quantity of salt produced in the United States during the years 1932 and 1933. A total of 487,105 tons was mined in 1932 and 530,816 tons in 1933 from the three salt mines located in Iberia Parish.[172]

The production of shells, gravel, and sand from the deposits of Louisiana decreased tremendously during the years 1932 and 1933. This decline was due largely to the completion of a number of State Highways and the curtailment of a number of similar projects at the beginning of 1932. In 1932, some 783,195 tons of shells, 805,936 tons of gravel, and 466,229 tons of sand were obtained from the deposits of the State. Approximately the same quantities were produced the following year.[173]

The Winnfield quarry, Winn Parish, continued to increase its output of crushed limestone in 1932. During that year a total of 467,256 tons was shipped. The following year the production decreased to 6,838 tons. This tremendous decrease was due to completion of State Highway projects, which were using this stone for road building.

An important industry entered Louisiana during this biennial period. In the latter part of 1933, the Mathieson Alkali Works commenced preparations for the erection of a chemical plant, located near the City of Lake Charles. The raw material to be used by this plant is the salt of the Hackberry salt dome, Cameron Parish. The salt is converted into brine in bringing it up to the surface for the pipe line mode of transportation. This company is one of the largest domestic producers of alkalies.

Because of the decrease in the production of minerals, and particularly that of sand, gravel, and shells in the State in 1932, the total revenue derived through the severance tax on minerals was less than in previous years. In 1932, a total of $1,826,445.59 was received by the Supervisor of Public Accounts from those operators severing minerals from the soil or water. The following year the revenue increased to $2,138,601.94 due to the production of sulphur and the increased production of crude petroleum.[174]

The privilege tax on the manufacture of carbon black[175] was repealed by the Legislature of 1932.[176] From October 1, 1931 to July 27, 1932, when the repeal measure became effective, the sum of $123,372.26 had been derived from the privilege tax on carbon black.[177]

The income derived from State mineral leases increased over the previous biennial period. During 1932 and 1933, thirty leases were executed by the Register of the State Land Office, on which a cash bonus of $17,913.50 was received. Production of crude petroleum was confined to leases executed during the period from 1920 to 1928. In addition to the royalties received from the production of crude petroleum and natural gas on State lands, the Register of the State Land Office derived royalties from the sulphur produced at the Jefferson Island mine and a portion of the sulphur produced at the Grande Ecaille sulphur mine. During the years 1932 and 1933, the State Land Office received the sum of $845,082.28 from cash bonuses and royalties.[178]

The Division of Minerals broadened its scope and extended its activities, not only in the oil and gas industry, but in nearly all phases of mineral industries. Because of the many demands of those interested in securing information regarding the recent intensive development of the mineral resources of southeast and southcentral Louisiana, the Division of Minerals established a district office in the City of New Orleans. The Geologist of the Bureau of Research, who had been engaged in research work at the School of

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[172] *Ibid.*, p. 430.

[173] *Report of the Supervisor of Public Accounts*, 1934, p. 116, p. 236.

[174] *Report of the Supervisor of Public Accounts*, 1934, p. 116, p. 236.

[175] *Acts* of La., No. 152, 1928.

[176] *Acts* of La., No. 42, 1932.

[177] *Report of Supervisor of Public Accounts*, 1934, p. 117.

[178] Biennial Repirt, *Register, State Land Office*, May, 1934, p. 4.

Freeport Sulphur Company's power plant and shops at Grande Ecaille (1933).
—Courtesy, Freeport Sulphur Co.

Geology of Louisiana State University at Baton Rouge, was appointed District Manager of the New Orleans Office.

The action taken by Commissioner Maestri was further prompted by the necessity to coordinate the work of the Division of Minerals with the present requirements of the National Recovery Administration, as it affected the minerals of the State. Another phase of Conservation which became increasingly important along the coast of Southeast Louisiana, was the biological research as regards fish life that may be affected by pollution from oil well effluents. The establishment of this District Office in New Orleans and the trend in the mineral developments in South Louisiana led to the transferring of the main office of the Division of Minerals to the City of New Orleans within a period of twelve months after the District Office had been established as will be seen in succeeding pages.

Because of the decline in the price of crude petroleum in 1932, a number of operators in North Louisiana, whose wells were producing small quantities of oil, wished to abandon such wells permanently. The Division of Minerals issued an order to prevent operators from dynamiting any oil well in the State when, in the opinion of the Commissioner of Conservation, such action would be detrimental to the ultimate production from a certain formation.[179] Another order was issued which prevented operators from pulling casing from a producing oil well when, in the opinion of the Commissioner of Conservation, such well could be operated at a profit.[180]

During the years 1932 and 1933, the Division of Minerals received an annual appropriation of $100,000.00.

President Franklin D. Roosevelt's program of conserving certain of the nation's natural resources and developing its mineral resources as a means of dealing with unemployment, which was initiated in the spring of 1933, bore splendid result during the following years, and various state legislatures began to enact measures to coordinate this work with the National Recovery Administration. During the Legislative Session of 1934, a measure was passed[181] providing for the proration of the production of crude petroleum in Louisiana. The Commissioner of Conservation, with the approval of the Governor, was authorized under such regulations as he may prescribe, to prorate the crude petroleum production among the several producers in this State so as to provide compliance with the National Recovery Act or any Act of Congress in force or hereafter enacted and any order or regulation issued under the authority of the Acts of Congress. The Act provided that any operator violating any provision or regulation issued under its authority shall be deemed guilty of a misdemeanor and upon conviction thereof shall be fined not more than Five Hundred Dollars ($500.00) or imprisonment for not more than six (6) months, or both, at the discretion of the Court, for each offense. Prosecutions and suits under this Act are to be held in the parish where such violations occur. All civil or criminal prosecutions instituted in the courts of this State by the Department of Conservation or under its direction and authority, and all appeals prosecuted from judgments adverse to the contention of the Department of Conservation, and all appeals taken from the orders and mandates of the Department of Conservation must be tried summarily, as the practice in the courts of Louisiana permits, and by preference.

During this Legislature, a measure was enacted[182] so as to correct an error in an Act passed in 1918,[183] providing for the conservation and sale of natural gas. The Act of 1918 authorized the

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[179] Rule 65 (August 30, 1932).
[180] Rule 65 (August 30, 1932).
[181] *Acts* of La., No. 61, 1934.
[182] *Acts* of La., No. 133, 1934.
[183] *Acts* of La., No. 270, 1918.

Department of Conservation to regulate the purchase and sale of natural gas and excepted only those municipal corporations and the pipe lines and distribution systems of corporations, the direct ownership of which may revert to any municipality. The Act of 1934 corrected this error by excepting all municipal corporations from the jurisdiction of the Department of Conservation.

Another conservation measure was amended during this Legislative Session. In 1920, an Act[184] was passed to conserve the petroleum resources of Louisiana and secure for each operator an opportunity to sell a fair share of the oil produced by him in a common pool and prevent any operator in the business of purchasing crude petroleum from discriminating in such purchases during a period of "overproduction". The Act of 1934[185] broadened the authority of the Department of Conservation by including the term "or at any time" in the section, which reads as follows: "That during a period of overproduction in any oil field, *or at any time,* it shall be the duty of the buying agencies to accord to each producer an opportunity to sell that proportion of the oil, taken by such agencies as the potential production of oil from the wells of such producer bears to the potential production thereof from all of the wells in such field . . ." Of this particular case, it cannot be said that those who framed and enacted the measure of 1920 were not informed in the petroleum industry or that they had no foresight. Oil does not fit well into man-made laws of economics, and in the year 1920, it was impossible to realize that there would some day be an over-production of crude petroleum and some of its products in the entire United States. The Act of 1920 defined the term "overproduction" as: "The potential production in excess of the quantity of oil being taken care of in the oil field." This definition refers only to the capacity of pipe lines or storage facilities to take care of the crude petroleum produced in a particular area at a particular time. Today, the term overproduction of crude petroleum not only refers to the quantity of crude petroleum in its natural state that cannot be taken care of in the national and international markets, but to the overproduction of products obtained from crude petroleum.

The extensive geophysical prospecting in South Louisiana during 1933 and the early part of 1934 led to numerous complaints by individuals and by State authorities because such operators were trespassing and prospecting private and State lands without the consent of the owners. As a solution to this problem, the Legislature enacted a measure,[186] making it unlawful for operators to prospect for oil, gas, or other minerals, or for other purposes on State lands, highways, or private property without the consent of the owner. The Act required that permit for such prospecting on State land must be obtained from the Register of the State Land Office, while those who wished to prospect on public highways, maintained by the Louisiana Highway Commission, must procure permit from the Highway Commission. If the highway is maintained by the parish, the permit must be then secured from the Police Jury of that respective parish. Consent to prospect on private property must be secured from the owner of such property. The penalty for violation of any of the provisions of this Act was a fine of not less than Five Hundred Dollars ($500.00) nor more than One Thousand Dollars ($1,000.00) or imprisonment of not less than thirty (30) days nor more than six (6) months or both fine and imprisonment, leaving same to the discretion of the court.

When geophysical prospecting began in the waters of South Louisiana, in 1927, the Department of Conservation, under authority of Act 127 of 1912, issued a regulation requiring operators to obtain permit to dynamite in public waters, in order to protect fish and other wild life.

Because of the accomplishments of the tentative geological survey program initiated by Commissioner Maestri in 1931, and because of the growing demand for the establishment of such a survey, the Legislature of 1934 passed a measure creating a Geological Survey of Louisiana as a Division of the Department of Conservation, providing funds for the carrying out of such work, and directing the Commissioner of Conservation to appoint a State Geologist. The Act[187] carried into effect Sections 1 and 2 of Article VI of the Constitution of Louisiana, and the provisions of Act 45 of 1930 relating to the mineral resources of Louisiana. The Commissioner of Conservation was authorized and directed to inaugurate and complete a geological survey of the entire State of Louisiana, in cooperation with the School of Geology and the Graduate School of Louisiana State University, and to assist in making topographic quadrangles, with contours, of Louisiana in cooperation with the Louisiana State Board of Engineers and the United States Geological Survey, and to appoint a State Geologist and necessary technical and clerical assistants. The Act required that both the State Geologist and the first assistant State Geologist were to be persons qualified in their profession, possessing a degree of Master of Science or its equivalent in Geology. Other technical assistants were to possess a Bachelor's Degree from some accredited university. To provide funds for this survey, the Act imposes a drilling fee of $50.00 per well for each permit issued by the Division of Minerals. These permits are valid for 90 days from date of issuance, and if not used within said period, a fee of $5.00 is charged for a renewal permit. However, when a well produces gas, oil, sulphur or other minerals and a severance tax is due upon the products of any such well, the permit fee of $50.00 is deducted by the Supervisor of Public Accounts from the amount of the severance tax due upon the product of each such well. The Act dedicated the funds as follows: fifty per cent (50%) allotted the Geological Survey program to be carried out in cooperation with the Louisiana State University; twenty-five per cent (25%) for making topographic quadrangles, with contours, in cooperation with the Louisiana State Board of Engineers and the United States Geological Survey; and the balance to be expended by the Commissioner of Conservation for general scientific research in relation to the mineral resources of Louisiana. The measure provided that the results of the Geological Survey be published by the State printer under the supervision of the Department of Conservation and Louisiana State University and that the University furnish the cooperative Geological Survey with adequate office space in the building occupied by the School of Geology.

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[184] *Acts* of La., No. 73, 1920.

[185] *Acts* of La., No. 120, 1934.

[186] *Acts* of La., No. 212, 1934.

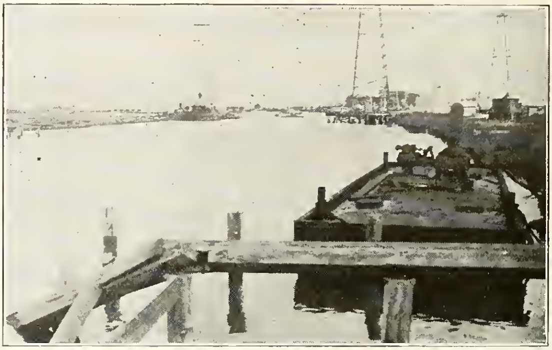
[187] *Acts* of La., No. 131, 1934.

Immediately after the measure was enacted, the Commissioner of Conservation set up, in the New Orleans District Office, the necessary assistance for the collection of the permit fee. Then he entered into an agreement with the Director of the School of Geology whereby the geological research program of the survey would be conducted by the School of Geology in cooperation with the Department. The establishment of this survey was the result of efforts for many years by the Department of Conservation and Louisiana State University to secure funds for such a survey.

It appears that a summary of the circumstances under which the Department of Conservation entered into cooperation with Louisiana State University, to carry out the geological research program of the survey, would be appropriate at this time. The Louisiana Geological Survey, which was organized in 1898 under the direction of Professor Gilbert D. Harris of Cornell University, conducted geological investigations in Louisiana until the survey was abandoned in 1909. During this period a number of exceedingly valuable reports were published which outlined, with surprising accuracy, the major geological features of the State. This survey was largely responsible for the early developments in the petroleum, natural gas, salt, and other mineral deposits of Louisiana. From the year 1909 until the year 1921, when the Department of Geology was established at Louisiana State University and the Department of Conservation established a thoroughly organized office of the Division of Minerals at Shreveport, very little information regarding the geology and mineral resources of Louisiana was published, although numerous companies explored and exploited the mineral resources of the State and some of their discoveries were recorded in various professional papers, but these papers were not

New Geology School Building at Louisiana State University (1932).

generally available. Following the establishment of these two Departments, a number of reports dealing with the mineral resources of Louisiana were published by the Department of Conservation, while Professor Henry V. Howe, of the Department of Geology of Louisiana State University, published a number of reports dealing with the geology of Louisiana. During this period, the Department of Conservation and Louisiana State University conducted a survey of the clay deposits of North Louisiana and published the results in three separate reports. Act No. 45 of 1930 brought into existence the Bureau of Scientific Research and Statistics, and established it as a Division of the Department of Conservation. Although no funds were provided by this Act for the establishment of a geological survey, Commissioner of Conservation, Robert S. Maestri, in June, 1931, appointed a Geologist to the Bureau of Scientific Research and Statistics, and detailed him at the School of Geology of Louisiana State University to work with the Director of the School of Geology in compiling geological reports by parishes and publishing the same as a series of bulletins. James P. Guillot, Secretary, Department of Conservation, and now also Acting Director of the Bureau of Scientific Research and Statistics, Dean Charles W. Pipkin of the Graduate School and Director Henry V. Howe of the School of Geology of Louisiana State University assisted to a large extent in accomplishing the approval of this tentative geological program. The Geologist, Cyril K. Moresi, and the Director of the School of Geology, Dr. Henry V. Howe, began at once with the preparation of a report of the Parish of Iberia. This Parish was selected as the first of the series because of its vast mineral resources of petroleum, sulphur and salt, and the important position it held in the salt dome literature of the world. In November, 1931, the first study entitled, "Geology of Iberia Parish", was published by the Department of Conservation. During the following two years, the Department of Conservation, through this cooperative program with Louisiana State University, published three additional geological bulletins. Time is yet too short to show the full effect of the investigations in South Louisiana conconducted by this survey during the years 1931, 1932, and 1933, but there is no doubt that it stimulated industry to further such research of the mineral resources of Louisiana. However, had it not been for the great increase of the petroleum produced in South Louisiana in 1932, 1933, and 1934, the total mineral production of Louisiana for these years would have continued downward at a rate as great as in preceding years. The School of Geology had been conducting investigations in South Louisiana for a number of years prior to 1931, and much scientific information was given to those exploring the mineral resources of this region. In June, 1933, the Geologist detailed at the School of Geology was transferred from there to the newly established District Office and now main office of the Division of Minerals in New Orleans, leaving the survey in an unstable condition until September 26, 1934, when a permanent survey was established.



Leeville oil field, Lafourche Parish, looking north, showing Bayou Lafourche and wells located on both sides of the Bayou (1934).

Louisiana is blessed with an abundance of mineral resources, although for some twenty-four years this State has been without a geological survey. Many of the Southern States have expended tremendous sums, amounting to as much as one-half of a million dollars annually, in conducting geological surveys of their respective states during past years. The present program, carried out on a cooperative basis with Louisiana State University, establishes a geological survey in Louisiana that is favorably comparable to most of the surveys being conducted in other Southern States at the present time.

Without topographic maps of the entire State, it is difficult and sometimes impossible for any intelligent planning and development of the State's valuable mineral resources. It is anticipated that the geological survey will make invaluable geological information available to the public and interest the various industries which will eventually consume our raw mineral products, because it is in the combination of some of the more common industries into associated groups that there lies the greatest possibility for expansion and development of the State's mineral resources.

The School of Geology of Louisiana State University is competent and ready to undertake this investigation and is contributing by furnishing the assistance of its faculty which includes such able scientists as Dr. H. V. Howe, Director, Dr. R. J. Russell, Dr. R. D. Russell, Dr. F. B. Kniffen, and Professor B. J. Craft, and is making available its laboratory equipment and is supplying office space for this survey. In consideration of this contribution, the Commissioner of Conservation has appointed Cyril K. Moresi, the State Geologist, to serve as the Department's administrator with the School of Geology in conducting the survey. James H. McGuirt has been appointed assistant to Mr. Moresi and his headquarters are in the School of Geology of Louisiana State University. In addition, the Department of Conservation is furnishing the School of Geology with funds to employ graduate students and such assistants as may be necessary to carry out this work for the scholastic year, 1934-35. For the following year, 1935-36, additional funds have been provided to employ more graduate students for this purpose. The survey has already been conducting investigations of the parishes of Cameron, Vermilion, St. Bernard, and Plaquemines. These Parishes were selected because of the intensive exploration and exploitation of the petroleum resources at this time.

The objective which Governor Parker and President T. D. Boyd, of Louisiana State University, had in mind when they re-established the Department of Geology in 1922, that of training young men for the geological and petroleum professions and to assist in the geological and petroleum divisions of the Department of Conservation has been partially fulfilled. Over 125 graduates of the School of Geology have entered the professions of geology and petroleum engineering during the past 13 years. Of the three professional men connected with the Division of Minerals, two are graduates of the School of Geology, while the geological survey is being carried out by graduates and graduate students of the School of Geology under the guidance of the Geology School faculty.

Activity in the petroleum industry of Southern Louisiana and of the entire Gulf Coast region in 1934 was devoted largely to an intensive program of exploration for additional petroleum reserves as the known petroleum reserve of the nation is sufficient to last approximately ten years. The active wildcatting program which had been going on for several years became even more widespread than before, covering not only the drilling of previously untouched or unproductive prospects and areas, but also a concerted attempt to prove up potential lower horizons and new sources of crude petroleum in and around many of the shallow producing domes and fields. For some time operators had been focusing more and more attention to South and Central Louisiana as a potential source of additional production of crude petroleum because Southern Louisiana offers more virgin or undeveloped areas than any other section of the Gulf Coast region.

During the first half of 1934, a total of 150 producing wells was completed in Southern Louisiana as against 102 for the first half of 1933. The production of crude petroleum in Southern Louisiana for the first half of 1934 amounted to 9,111,207 barrels as against 6,932,169 barrels for the first six months of 1933. Over 1,500,000 acres were leased during the first half of 1934, representing an investment of more than $1,000,000. A large proportion of this acreage was leased along the Jackson or so called Conroe Trend, which is a strip approximately 25 miles wide running northeasterly through the parishes of Beauregard, Vernon, Rapides, and Avoyelles. More geophysical work was done during the first half of 1934 than at any time during the past and it has been estimated that at least $500,000 has been spent monthly for geophysical work alone. In July, 1934, there was a total of 63 geophysical crews operating in Coastal Louisiana.[188]

As a result of the intensive exploration of the petroleum resources of South Louisiana, five new fields were discovered and a number of very productive deeper horizons in older fields were uncovered. The Bosco oil field, located at the junction of the parishes of Acadia, Lafayette, and St. Landry, and the Roanoke oil fields, located in Jefferson Davis Parish, appear to be the most important so far discovered and are similar in character to the Iowa oil field. The potential production of the Bosco field, which field was discovered in May, 1934, appears to be greater than that of the Iowa field. The Roanoke field was discovered in June, 1934, and developments have not progressed to such an extent that the potential production can be determined. Initial production from the Bosco and Roanoke fields have come from depths of 7,845 feet and 8,665 feet respectively. New deep horizons were encountered in the East Hackberry oil field, Cameron Parish, and production was extended in the Sulphur oil field, Calcasieu Parish during the spring of 1934. In June, 1934, petroleum was obtained from the Lake Hermitage salt dome, Plaquemines Parish, although the well produced only a small quantity of oil and was abandoned. During this month petroleum was discovered on another of the older fields of South Louisiana. This field, the New Iberia oil field, Iberia Parish, had not produced oil in commercial quantities for some thirteen years. In September, 1934, a large gas well was completed on the Garden Island Bay salt dome, Plaquemines Parish. The gas from this well cannot be used for domestic purposes without the removal of the sulphur content. On October 12, 1934, commercial production of petroleum was obtained from the Castle Mills or Gillis area which is located in northeast Calcasieu Parish. During the latter part of November, another coastal oil field was opened up. This field, the Four Isle oil field, is located in the tidal water of Terrebonne Parish. The discovery well had an initial production of 2,230 barrels of oil daily, flowing through a half-inch choke. Due to the numerous fields and deeper horizons discovered in South Louisiana during 1934, the total daily production of petroleum for this territory has increased from 44,000 barrels in January, 1934, to 75,000 barrels in November and were it not for proration, South Louisiana could produce an additional 50,000 barrels daily.

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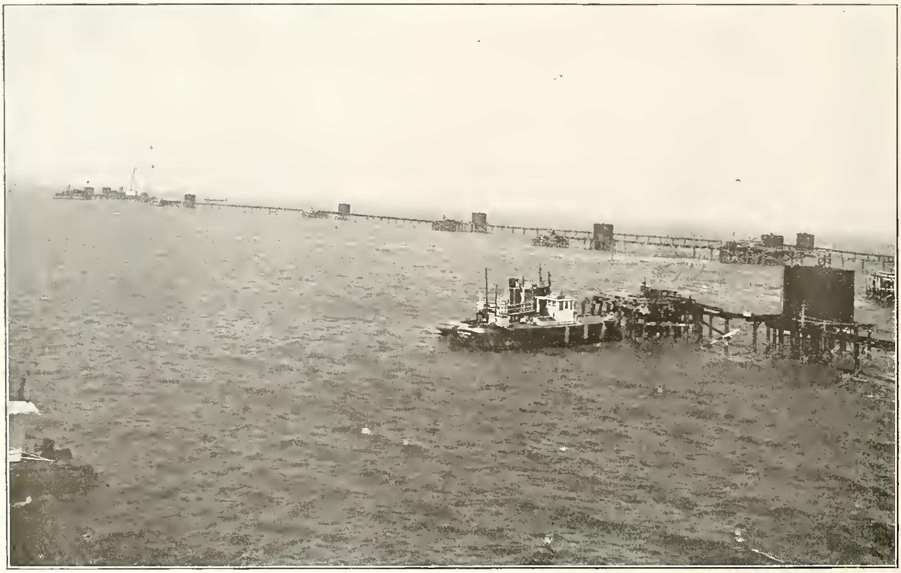
[188] Williams, Neil, "Open Seven New Pools in Texas-Louisiana Gulf Coastal Division; Trend Toward Louisiana", *Oil and Gas Journal*, Vol. 33, No. 10, July 26, 1934, p. 81.

The chemical industry of the country embarked on a tremendous program of expansion and new construction during 1933 and 1934. Approximately $100,000,000.00 have been spent or set aside for the building of new plants. Approximately one-third (1/3) of this total sum is represented in six important projects erected in the South. Three of these projects have been established within the State of Louisiana. We have already described the large sulphur plant located on the Grande Ecaille salt dome, Plaquemines Parish, which began operations in December, 1933, and the erection of the $8,000,000.00 chemical plant by the Mathieson Alkali Works near the City of Lake Charles. In the early part of 1934, the Solvay Process Company began erecting a large alkali plant north of the City of Baton Rouge. This plant will utilize the salt from the Choctaw salt dome, Iberville Parish, to produce alkalies. The Solvay Process Company is another of the larger producers of alkalies. The site of the Solvay Process Company was selected after an intensive and extended study of the most advantageous location for a new alkali industry. This plant will utilize for process use, the surplus low-pressure steam from the plant of the Louisiana Steam Products, their next door neighbor. The power plant of the Southern Steam Products uses the waste still gases of its neighbors, the Standard Oil Company of Louisiana, and in turn the Southern Steam Products pays for this gas in process steam and electrical energy.

The completion of the Intracoastal Canal from New Orleans to Galveston, Texas, connecting South Louisiana and Southeast Texas through



Lake Barre oil field, Terrebonne Parish, showing extent of development in the northern portion of the field (1933).

barge transportation with the entire Mississippi and Ohio River basins, opens up, for industrial development, this area which is rich in mineral resources and cheap fuel—two of the most important considerations for heavy chemical industries.

Louisiana offers many opportunities to industry to utilize the raw mineral resources of petroleum, natural gas, salt and sulphur. The raw materials most important to the chemical industry are widely distributed. The salt domes of Louisiana supply at least two of the seven most widely used, that is salt and sulphur. With an abundance of oxygen and nitrogen from the air, our petroleum, natural gas, salt and sulphur deposits must eventually become the center of extensive chemical developments. There are five factors in the selections of sites for chemical industries, or for that matter, any industry: transportation, raw materials, fuel, labor, and topography of the land. Louisiana, and particularly South Louisiana, has an abundant supply of raw materials and fuel, while the labor supply is adequate. Railroad facilities and the Intracoastal canal offer diversified and cheap transportation, while the topography of the land is well adapted to the erection of large plants.

This program of industrial migration has only started. The same factors that attracted the chemical *producing* industries, such as the Freeport Sulphur Company at Grande Ecaille, the Mathieson Alkali Works at Lake Charles and the Solvay Process Company at Baton Rouge, are certain to attract *consuming* industries. With these, in turn, will come the other industries of a diversified industrial development.

Complicated and difficult administrative problems, that of prorating the several producers of petroleum in the State in order to conform with the quota allowed Louisiana by the National Recovery Administration, presented itself during the early part of 1934. Most of the larger oil operators cooperated wholeheartedly with the program adopted by the Division of Minerals.

The Division of Minerals established the policy of reducing the daily production of the larger wells, and those wells were operated by several of the large oil corporations. The Division of Minerals issued a regulation[189] requiring all operators to supply the Division with weekly reports giving the status of drilling activity, average daily production of each well and the disposition of bleed water and waste fluids. These reports were to be signed by the person or persons in charge of the operations of each particular field or locality.

One field in South Louisiana presented a series of complicated problems. The producing horizons were very productive. There were five operators, three of which were independent firms, owning small adjoining leases. Producing wells were so closely spaced that a well on one lease could drain the oil on the neighboring lease. It was impossible to regulate the spacing of the wells as the productive area was confined to a portion of each lease; the boundaries of each such lease were irregular and the number of acres in each lease varied. There were no pipe line facilities in the field and the oil was transported by barge. This added to the irregularities as the loaded barges could only be moved during the period of the day when the tide was high, thus resulting in irregular movements of oil. The Division of Minerals issued three regulations in order to prevent the operators from producing and marketing any more oil than was allotted. Each operator producing petroleum and transporting such oil by barge or tank car was required to notify the Commissioner of Conservation of the time and place they wished to elect to transfer any and all oil from their respective storage tanks to barges or railroad tank car for shipment.[190] Another order required each operator to submit to the Commissioner of Conservation, a copy of the bill of lading, as well as a copy of the invoice, showing to whom the oil was being shipped.[191] The third order required each operator to obtain a permit from the Division of Minerals, authorizing the loading and shipment of oil to any person, firm, association, or corporation to whom the said oil had been shipped or consigned.[192]

The increased activity in the petroleum industry of Southern Louisiana and the need of coordinating the work of this Division with the other Divisions of the Department brought about the transfer of the main office of the Division of Minerals from Shreveport to New Orleans in September, 1934. The Commissioner of Conservation recognized this tremendous regional development by the establishment of a District Of-

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[189] Rule 66.
[190] Rule 68.
[191] Rule 69.
[192] Rule 70.

fice of the Division of Minerals in New Orleans in September, 1934. The change of the main office of the Division of Minerals from Shreveport to New Orleans has, therefore, been not merely logical, but almost inevitable and will further increase the contribution of the Department of Conservation to the still greater and more prosperous development of the State's mineral resources.

The collection of the permit fee of fifty dollars to drill wells for minerals began on August 1, 1934. Immediately afterwards, a number of questions, not provided for in the Act, arose regarding the collection of this fee. With regard to one question, the Division of Minerals, with the approval of the Attorney General, issued an order[193] requiring a permit, the Division charging a fee of fifty dollars, for any well or wells not having produced oil, gas, sulphur or other minerals in commercial quantities, or instances where actual drilling had not been prosecuted on such well or wells within twelve months prior to August 1, 1934. In another question regarding the collection of the fee for the drilling permit for any well drilled after August 1, 1934, the Attorney General decided that the Department has the authority to collect the permit fee of fifty dollars in all cases where drilling operations had not actually begun under a permit issued prior to August 1, 1934.

In November, 1934, the Geological Survey and the Division of Minerals, with the advice of the Louisiana State Board of Health, recommended to the Commissioner of Conservation that a survey of the underground water resources of Louisiana be undertaken. This program received that approval of the Commissioner and the Division of Minerals issued an order[194] requiring that all persons, firms, associations, or corporations engaged in the drilling of water wells, either for personal or business purposes, keep an accurate and complete record of all such information required by the Department, including an accurate and complete log of each and every well drilled or deepened and furnish the Department with two copies of the log of each well, filled out on forms supplied by the Department. The order required that such information and log be furnished not later than ten days after any such well is completed or abandoned.

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SUMMARY

Petroleum and natural gas have been the most rapidly and the most ruthlessly exploited of all southern resources. The business of producing petroleum and natural gas does not fit well into man-made laws. Petroleum and natural gas are no person's property until they have been brought up to the surface. "The American petroleum law is based on the English common law doctrine in regard to underground water; one must possess before one owns. The oil pool, however, is a geologic unit and true to the law of liquids, a well on one lot may drain the oil resources under all neighboring tracts. This fact leads to competitive drilling and all wastes of the industry which no amount of technical improvement has been able to halt."[195] Therefore, each operator attempts to drain the largest possible underground area in the shortest length of time before the oil is secured by a competitor. Law can compel an operator to drill offset wells as protection to a lessee. But in a recent case[196] in the Louisiana, Monroe Division of the District Court of the United States, the Court *held* that before a lessor is entitled to damages for breach of implied obligations imposed on lessee or operator to drill a well to prevent drainage of oil or gas, or to annul lease, he must demand drilling before the expiration of the current term for which the stipulated payment has been received, and refuse to accept rentals for further delays. In this case the lessor accepted stipulated payment from the lessee or operator for the purpose of deferring drilling operations and did not demand drilling before the expiration of the current term although adjacent wells were draining his property. Judge Dawkins, who decided the case, although realizing that an injustice had been done to the owner of the property or lessor because of neglect on his

(Continued on Page 45)

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[193] Rule 70.

[194] Rule 71.

[195] Vance, R. B., "Human Geography of the South", *Univ. North Carolina Press*, 1932 p. 337.

[196] *Lindow v. Southern Carbon Co.*, No. 2065, 5 Federal Supp., p. 818.

The War on Winged Predators.*

By WILLIAM VOGT

Photographs by the National Association of Audubon Societies

NEVER probably in the history of the world, has there been a popular campaign of extermination waged against any group of animals comparable to the war now being carried on against the predatory birds of the United States. Various forms of life have in the past been attacked and wiped out. This destruction has been, however, usually of a sporadic and often unintentional nature. The phenomenon of millions of citizens of a nation bending almost daily effort and thought toward the destruction of a group of native wild creatures is, so far as we know, without precedent. The situation is fraught with the gravest significance because it represents a popular rebellion against and contempt for the reasoned testimony of virtually all disinterested investigators that have studied the life-histories and the economic and biological relationships of these birds.

There are, we are told, 7,000,000 licensed hunters in the United States. To this number can be added, certainly, many thousands of farm boys and backwoodsmen not included in the tally. There can be no doubt that the hands of the vast majority of this great standing army are set against our hawks and owls—"vermin" in the hunter's parlance. To a lesser degree, their enmity is directed against herons, kingfishers, pelicans — any bird whose diet is assumed to include forms killed by men in the name of sport. We have even heard a fantastic tale of phoebes that were shot because it was thought they were eating trout fry.

In man's relentless conflict with Nature, various forms of wildlife have, in the past, been wiped out. Shall we suffer a repetition of this in the needless loss of our winged predators, which investigation has proved to be of high economic value? These are Screech Owls, photographed by O. E. Baynard.

Whether or not this was true, we have only to turn to sportsmen's magazines, to find, constantly reiterated, the thought that, "The only good predator is the dead one."

The macabre effectiveness of this campaign is attested by letters from many parts of the country, describing the disappearance of hawks and owls. They are among the rarest of birds in the region with which the writer is most familiar, but one can not judge the status of a wide-ranging species from a few localities; in this case, such snap judgment is not necessary. From the Pacific to the Atlantic correspondents tell of sharp reductions in the normal populations of these birds. There is no defense on any score for this campaign of destruction. This assertion is made categorically and without hesitation. It is not made entirely on the writer's responsibility. There are too many witnesses, from Dr. A. K. Fisher to Herbert L. Stoddard and Dr. S. Prentiss Baldwin, to justify equivocation on this score. Paul L. Errington, studying the effect on bobwhite of hawks and owls, presents particularly illuminating data. Not even from the selfish point of view of the sportsman is there any excuse for the destruction of these birds—a point to which we shall return later.

From the farmer's angle, almost all hawks and owls in the United States —sixty-seven out of seventy-three species — have been called either harmless or beneficial. A classical comment on the relation of hawks and owls to the farmer was given nearly fifty years ago by Dr. C. Hart Merriam, in commenting on a bounty "for the benefit of agriculture" paid for dead hawks and owls, mink and weasels, by the State of Pennsylvania.

"By virtue of this act," said Dr. Mer-

Courtesy of American Forests.

A young Duck Hawk photographed at the nest site on Sugarloaf Mountain in Massachusetts by Herbert K. Job.

riam, "$90,000 has been paid in bounties. . . . This represents the destruction of at least 128,571 of the above mentioned animals, most of which were hawks and owls.

"Granting that 5,000 chickens are killed annually in Pennsylvania by hawks and owls, and that they are worth twenty-five cents each (a liberal estimate in view of the fact that a large proportion of them are killed when very young), the total loss would be $1,250, and the poultry killed in a year and a half . . . would be worth $1,875. Hence it appears that during the past eighteen months the State of Pennsylvania expended $90,000 to save its farmers a loss of $1,875. But this estimate by no means represents the actual loss to the farmer and taxpayer of the State. It is within bounds to say that within the course of a year every hawk and owl destroys at least a thousand mice or their equivalent in insects, and each mouse or its equivalent so destroyed would cause the loss of at least two cents per annum. Therefore, omitting all reference to the enormous increase in the numbers of these animals when Nature's means of holding them in check has been removed, the lowest possible estimate of the value to the farmer of each hawk and owl and weasel would be twenty dollars a year or thirty dollars in a year and a half.

"Hence, in addition to the $90,000 actually expended by the state in destroying 128,571 of its benefactors, it has incurred a loss to its agricultural interests of at least $3,857,130, or a total loss of $3,947,130 in a year and a half, which is at the rate of $2,631,420 per annum. In other words, the state has thrown away $2,105 for every dollar saved! And even this does not represent fairly the full loss, for the slaughter of such a vast number of predaceous birds and mammals is almost certain to be followed by a correspondingly enormous increase in the numbers of mice and insects formerly held in check by them, and it will take many years to restore the balance thus blindly destroyed through ignorance of the economic relations of our common birds and mammals."

Ordinarily, nowadays, such bounties are not offered for the "benefit" of agriculture. They are offered for the "benefit" of sport and they continue to be offered by the State of Pennsylvania. It is true that the vermin for which bounties are paid is a little more circumspectly chosen; this has small effect, however, because most sportsmen will not take the trouble to find out what they are killing, until after the bird is dead. Of 503 "goshawks" offered for bounty in Pennsylvania, only seventy-six were actually of this species.

Most of the predatory birds, says the author, are beneficial in their feeding habits. Witness the Sparrow Hawk, boon to farmers, which feeds chiefly on insects.

There has been widely syndicated within the past few months, the photograph of a Mr. Wilcox, of Arkansas, who during "the last seven years has killed 5,000 hawks" on his so-called duck sanctuary. Mr. Wilcox proudly displays the carcass of a red-tailed hawk, of which Dr. Fisher wrote, "It has been demonstrated by careful stomach examination that poultry and game birds do not constitute more than ten per cent of the food of this hawk." The huge debt Mr. Wilcox owes his farmer neighbors can easily be computed on the basis of Dr. Merriam's figures.

The evidence of such scientists as Merriam, Fisher, Stoddard, and many others, is not the result of hearsay; it is arrived at only after the most painstaking study of live birds, as well as of the stomach contents of dead ones. If space were available, evidence for the hawk and owl from the point of view of the agriculturist could be extended for many pages.

Another great class of interested persons that until comparatively recently has been almost completely ignored by conservation departments is the men and women, boys and girls, who go into the forests, fields, swamps, or marshes, for no other purpose than to enjoy them. This enjoyment may take various forms—esthetic, scientific, athletic. Perhaps it is merely solitude and rest that are sought after the dullness and strain of life in modern cities.

Artistic in its forest frame, this Osprey's nest is built high on a dead stub in the Maine woods.

The nest of the King of birds—the Bald Eagle—photographed in Florida by O. E. Baynard.

An unusual shot of the Great Horned Owl, glaring balefully from the nest.

The writer is placed in a peculiarly favorable place for observing the reactions of these non-killers. A considerable proportion of his time is filled by answering their questions and taking them closer to the out-of-doors that to them is a mystery of never failing enthrallment. Time and again, as we have watched a marsh hawk thrusting fiercely downward toward some luckless meadow mouse, or a sparrow hawk hovering daintily above a grasshopper, or a duck hawk trying to cut from a flock of "peep" a lone sandpiper, there have leaped to mind Elizabeth Coatsworth's lines:

> "Hawks stir the blood like fiercely ringing bells
> Or far off bugles . . . "

Invariably these people are thrilled. Their eyes light up. Their blood moves faster. They have seen, for an instant, life at its quickest! We have seen a group of thirty men and women, wordless and all but breathless, during five full minutes of a falcon's pursuit of a flock of starlings. Few of them were capable of identifying either of the species involved; not one of them but was stirred by the headlong plunging of the raptor. Rare indeed is the non-hunting seeker after the outdoors who does not treasure somewhere in his memory the picture of a raptorial bird. It may be a harrier in its mating dance; it may be an eagle swinging on majestic pinions; it may be a horned owl, glaring balefully before it darts away on silent wings. Whatever the bird, this citizen of the United States has fully as much right to his enjoyment as has the hunter to his; in fact he has more right since he does not destroy the object of his interest and since the probabilities are strongly in favor of the live "vermin's" being an economic asset.

It is not suggested here that hunting should be abolished. The sport is conceded to be of value, both economically and recreationally. It is merely suggested that management of our wildlife for sportsmen alone is the crassest sort of class-discrimination; that the sportsman has no more stake in the nation's wildlife than has the farmer and the camper, hiker and picnicker. If the sportsman retorts, as he usually does, "I pay the freight!" the answer is obvious; why shouldn't he, since he—as part of an armed force of 7,000,000 men and women—is the greatest destructive force encountered by our game?

But if wildlife is managed and made to produce an annual crop above and beyond the perpetuation needs of the species, it would be arrogantly selfish to say the sportsman has no right to the surplus. With this point conceded (and it is, unhappily, more than many sportsmen will concede the non-hunter) what should be the relations of the hunter toward the predatory bird, toward the hawk and the owl?

Here, once more, one may turn to the unprejudiced investigators—in many instances scientists employed by the sportsmen themselves—for abundant testimony in favor of these birds. A few hawks and owls are admittedly predatory on game, or other economically valuable species. But as we learn more we damn less. The marsh hawk that has been mercilessly shot on the quail preserves of the South was found by Stoddard in his investigation of the bob-white's economy, to be not only not a liability, but a distinct asset. He called the marsh hawk, because of the large numbers of quail enemies it destroys, "probably the best benefactor the quail has in this area."

As has been said, most of the predatory birds are directly beneficial in their feeding habits. The sharp-shinned and Cooper's hawks are generally recognized, along with a few uncommon species such as the goshawk, to be destructive in their feeding habits. Granted that this destruction takes place, we must not forget that the so-called harmful predators also lend their weight to the biological balance. It must be logically obvious that a Cooper's hawk feeding on, let us say, ruffed grouse, will more easily take the slowest and most stupid birds. It must again be obvious that sick birds—perhaps the carriers of the dread tularemia, fatal alike to grouse and man—will be less able to escape these scourges of the skies. It can scarcely be doubted that even the so-called destructive predators must serve the function of culling out the unfit and raising the physical standards of the creatures on which they feed. Thus, it seems that sportsmen in killing predators are destroying valuable allies.

Most hawks and owls are beneficial to the agriculturist. All hawks and owls are a source of inspiration and pleasure to the non-hunting citizen who seeks the recreation offered by the out-of-doors. Most hawks and owls do not habitually attack game; those that do, unquestionably act as Nature's sanitary inspectors and keep the game up to snuff. If these points are conceded—and there is vastly more evidence in their favor than

(Continued on Page 44)

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GEOLOGICAL SURVEY

DR. H. V. HOWE, *Director,*
School of Geology of Louisiana State University
and Director, Research Division, Louisiana
Geological Survey

C. K. MORESI, *State Geologist,*
Louisiana Geological Survey,
Department of Conservation

OFFICES AND LABORATORIES ESTABLISHED FOR RESEARCH DIVISION

Entering its third month of existence, the newly re-organized Research Division of the Louisiana Geological Survey, under the able guidance of the Geology School Faculty of the Louisiana State University, reports rapid progress. The Research Division of the Survey is established in quarters in the Geology Building of the Louisiana State University. The space, consisting of three offices on the second floor and 5000 square feet on the fourth floor, was given to the Survey by the Louisiana State University.

The following have been added to the staff: Morton B. Stephenson, Cartographer; W. D. Chawner and C. F. Dohm, Assistant Geologists.

INVESTIGATIONS OF CAMERON AND VERMILION PARISHES

Dr. Henry V. Howe, Dr. R. J. Russell, James H. McGuirt and C. F. Dohm have made several trips to Cameron and Vermilion Parishes obtaining geological information. This material is to be used in the Cameron and Vermilion bulletin now under preparation.

FIELD TRIPS AND PAPERS PRESENTED

SHREVEPORT GEOLOGICAL SOCIETY FIELD TRIP

Dr. Henry V. Howe, Director of the School of Geology of Louisiana State University, attended the Eleventh Annual Field Trip of the Shreveport Geological Society, held in the Clarke and Wayne Counties, Mississippi, October 5 and 6, and delivered an address before the meeting of the Society in Laurel, Mississippi, on the night of October 5th. The subject of his address was *A Preliminary Paleontologic Analysis of the Upper and Lower Chickasawhay Members of the Catahoula Formation.* The address was printed in full in the Handbook of the Shreveport Geological Society, pp. 22-28, 2 charts, 1 plate, October, 1934. He was accompanied by Mr. James H. McGuirt, Assistant State Geologist; Dr. R. Dana Russell, Petrographer of the School of Geology; and by a number of graduate students. Mr. McGuirt supplied the Shreveport Geological Society with a report on *Bryozoa of the Upper and Lower Chickasawhay Members of the Catahoula Formation of Wayne County, Mississippi,* which was printed in the Handbook of the Society, pp. 28-29, 1 chart, October, 1934. The meeting was attended by more than eighty geologists.

SAN ANTONIO GEOLOGICAL SOCIETY FIELD TRIP

Dr. Henry V. Howe attended the Field Trip of the San Antonio Geological Society, held in the vicinity of Laredo, Texas, and Monterey, Mexico, November 2-5, inclusive. He presented an address before the meeting of the San Antonio Geological Society at Laredo on the morning of November 3rd. The title of his address was, *The Relationship of the Vicksburg Group of Formations to the Catahoula Formations in Louisiana and Mississippi.* The meeting was attended by fully a hundred geologists.

DR. HOWE PUBLISHES PAPER ON PALEONTOLOGY

Dr. Howe published a short paper *Bairdia subdeltoides (Münster) in the American Tertiary* in the September issue of the Journal of Paleontology, pp. 388-389, text figs. la-c. In it is recorded the Americal occurrence of a famous European fossil Ostracode. Another paper by him entitled, *Bitubulogenerina, a new Eocene genus of Foraminifera,* will appear in the December issue of the same Journal. It will contain figures and descriptions of several distinctive Louisiana fossil foraminifera.

DR. R. J. RUSSELL PUBLISHES STUDY ON THE DUST STORM AT BATON ROUGE

A paper on the *Dust Storm of April, 1934, at Baton Rouge, La.,* by R. J. Russell and R. D. Russell, appeared in the May, 1934, issue of the Monthly Weather Review, published by the United States Weather Bureau. Weather conditions responsible for the atmospheric dust were summarized and observations taken at Louisiana State University tabulated. Samples of dust collected on damp cloth exposed about 50 feet above the ground were subjected to petrographic analysis. Volcanic glass was found to constitute 56% of the dust of determinable size, quartz 17%, and ash and carbonaceous material 10%, clay 5%, musconite mica 5%, diatoms 2%, feldspars 1%. Also identified were chlorite, biotite, microcline, orthoclase, hematite, limonite, calcite, epidote, and zircon. The probable source of the dust was thought to lie in the states of the Great Plains. The storm was interesting as causing the greatest general reduction in visibility known in southern Louisiana as the result of atmospheric dust. The mineralogic composition should prove of value in determining whether certain sedimentary deposits in Louisiana have originated from the deposition of dust.

COASTAL MARSHES OF SOUTHWESTERN LOUISIANA

Coastal Marshes of Southwestern Louisiana, was the title of a paper presented in Philadelphia on December 27th to the Association of American Geographers by Dr. R. J. Russell. The study was concerned primarily with the most recent phases of the geological history of Cameron and Vermilion Parishes and described the origin of land and water features in the marsh belt.

DR. R. D. RUSSELL PRESENTS PAPER AT MEETING OF GEOLOGICAL SOCIETY OF AMERICA HELD IN ROCHESTER, N. Y.

Dr. R. D. Russell presented to the Geological Society of America, at Rochester, N. Y., Dec. 27th, a paper entitled, *Mineral Composition of Mississippi River Bed Materials.* Five days later at the American Association for the Advancement of Science meeting, in Pittsburgh, he presented a paper on *The Size Distribution of Minerals in Mississippi River Sands.* Both pieces of work were based on sediments collected by the Mississippi River Commission and constitute the first results of an extensive investigation Dr. Russell is conducting on the sedimentary petrography of the River and its tributaries.

SLUMP NEAR FORT ADAMS, MISSISSIPPI

A paper on the *Slump Near Fort Adams, Mississippi,* which occurred on October 8, 1933, was presented to the Geological Society of America by Dr. R. J. Russell, on Dec. 29th at the Rochester meeting. The area affected was found by plane table survey to include 97 acres on and below a bluff rising nearly 270 feet above the low water stage of the River. The disturbed condition of the affected area sheds light on the geology of similar regions along the Sabine and Ouachita.

PROFESSOR CRAFT PRESENTS TWO PAPERS AT THE NEW YORK MEETING OF THE A. I. M. E.

Benjamin C. Craft, Assistant Professor of Petroleum Engineering, Louisiana State University, presented a paper at the New York meeting, February, 1934, of the American Institute of Mining and Metallurgical Engineers on *Oil and Gas Development in Louisiana.* The paper describes the principal events in the oil and gas operations for Louisiana during 1933. Included in the tables is a list of all fields in Louisiana giving the proven oil and gas acreage, total oil and gas production and production during 1932 and 1933, daily average production, production per acre and per acre-foot, number of oil and gas wells completed, average depth to the producing horizons, oil production methods, average rock pressures, character of oil and gas produced, name of the producing horizon and deepest zone tested.

Benjamin C. Craft, Assistant Professor of Petroleum Engineering, Louisiana State University, attended the Tulsa meeting, October, 1934, of the American Institute of Mining and Metallurgical Engineers. The subject of his paper was *The Effect of Temperature, Pressure, and Water-Cement*

(Continued on Page 43)

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YOUR PART

Consult your teacher.

Ask that the purpose and plans of the Nature Guardian Club be explained to you and the class.

Ask for an application card.

Get a responsible person to indorse it, after proving that you fully understand the duties of a Nature Guardian.

Sign the application and mail the card postpaid, or give to your teacher, to send with cards from all the class.

OUR PART

We send the application card.

We send you a handsome badge, a certificate of membership, Nature Guardian pamphlets, and other literature.

This is all free, and is carried on with the purpose of instilling in the children's minds a knowledge of Louisiana's wild life and a thorough understanding of its economic value to the State.

It also aims to develop individual humanitarianism. Even within this short time an amazing improvement has been made in the mental attitude of our young folks toward the conservation and protection of Louisiana's natural resources.

EDITORIAL

Dear Guardians:

A new year has come again with all its possibilities for doing good and for making others happy! How fine a thing it is that we can turn our backs on old 1934 with its mistakes and disappointments and begin 1935 with high hopes and earnest plans for making the world a better place in which to live.

I hope each Guardian will have a happy Holiday Season, and will go back to school resolved to keep his Pledge of Allegiance and to carry the "Message of Conservation" to all his associates.

I hope each Guardian will remember that God in His wisdom has seen fit to lavish on Louisiana more wonderful gifts, perhaps, than He has given to any other state—and at this season of universal gift-giving each will pause awhile to thank Him for His loving kindness to us and to our State.

So, dear Guardians, I close by saying with Tiny Tim, "God bless us everyone."

The Editor.

It is certainly most gratifying to know that the Nature Guardians are exerting a fine influence not only in Louisiana but in other states as well. This letter proves it:

1355 E. John's Ave.,
Decatur, Ill.,
November 8, 1934.

Dear Editor:

If it is possible I wish to enroll my whole family in the Nature Guardian Club. There are eight in my family—all boys. One of them is a Boy Scout with "Star" rank, and one will join the Scouts the first of next year.

We all believe in Conservation and I want them to have something to look to and to conserve. I want them to like our natural resources.

Yours truly,
Ralph G. Smith.

We are very glad to welcome you and your boys into the Club. Please let us have some letters and poems from you; I hope that the Guardians will write letters of welcome to the boys!

A little poem has come to my desk from John Winters, but he failed to put his address on it. Here it is:

When Old Santa Claus goes about in his sleigh
He gives Christmas goodies to all on his way.
He doesn't forget the bird or the beast,
For the lowliest creature he provides a fine feast.

There are nuts for the squirrel and grain for the crow,
As they frolic about in the sleet and the snow.
For Old Santa Claus, so jolly and gay
Brings joy and good cheer on glad Christmas Day.

Here is a fine letter describing a group of young conservationists in St. Louis:

4638 Vernon Ave.,
St. Louis, Mo.

DEAR EDITOR:

I am receiving your magazine every quarter and getting splendid information from it. I have organized a Biology Club, with 26 members. These are divided into groups for study such things as Insects, Birds, Trees and Flowers. The activity and the results of this Club have drawn many visitors. We have lectures and hikes, which are very popular. Out in the woods we teach our young folks to enjoy Nature, and to conserve the trees, birds and animals.

Last week we had a fine lecture on "Snakes and Their Uses", the material for which was got from your splendid "Conservation Review". I introduced the magazine to the Club and the members thought it was wonderful. They read about the N. G. Club and thought it would be a great idea to join it. Please send us some membership cards. We St. Louis biologists will stick with you and your ideas of Conservation. Our Biology Club sends greetings to your Nature Guardians! Let us all carry on the good work!

Sincerely yours,

SOL MILLMAN (*Organizer*).

(I am asking Sol to write me again about the Club, so I can send the application cards he wishes.—The Editor.)

S. L. I. Training School,
Lafayette, La.,
October, 1934.

DEAR EDITOR:

We appreciate so much your kindness in sending the application blanks we ordered. They are filled out and ready to return.

Friday we organized our little Club. We elected a president, vice-president and secretary. We are going to do our very best to make this organization a success.

Yours truly,

WILBUR RHEY MCMILLAN.

(*Teacher*—L. SCHUMACHER.)

We wish Wilbur's Club all the success in the world!

Here is a letter from a little girl in Covington, La.:

DEAR EDITOR:

I heard about the Nature Guardian Club and think I would like to join. Will you please send me an application card? I live in Covington and there are many wild plants around in the woods. I would like to know how to take good care of them. We also have pretty birds that fly around our house and sing songs to us. At school we have all kinds of trees.

Yours truly,

PATSY LE GEAI.

Come in, Patsy. We know that you will make a true Guardian. And still they come!

ST. NICHOLAS

St. Nick is a jolly fellow
He hunts the whole world through
For pretty toys for girls and boys
And gifts for me and you.

He brings a hearty message
To all here on this earth,
So let's be gay this Christmas Day,
And spread good-will and mirth.

—SELECTED.

Quitman, La.
Beech Springs High School,
Nov. 12, 1934.

DEAR EDITOR:

My class wishes to have a Nature Guardian Club. We shall need twenty-one application cards. We were all very grateful for the materials that you sent.

Yours truly,

(MISS) CALLIE MAE EWING, *Teacher*.

THE BLACK-CAPPED CHICKADEE

Anyone fond of walking in the woods in the fall (as I am) is sure to be greeted by a cheery "Chickadee-dee-dee" of this little feathered optimist. He is always busy and has a fearless and confiding disposition.

The chickadee is a universal favorite, and none of our birds do more good in destroying injurious insects than he does. 554 plant lice have been found in the stomach of a single chickadee. In the winter he also eats seeds of various kinds.

The song is a clear sweet whistle of three notes

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uttered by both male and female. The nest is made in a hole in a stump dug out by the birds themselves if the wood is sufficiently soft. Often as many as eight eggs are laid. Don't you think that is an unusual number for so small a bird?

A faithful Guardian,

EVELLYN DENTON,
R. F. D. No. 3, Colfax, La.

We regret that the allotted space will not permit the publication of the voluminous contributions submitted and which are so uniformly good that it is difficult to make a selection. Guardians will please note that it is often necessary to do some editing in order to fit material to our needs.

GEOLOGICAL SURVEY

(Continued from page 40)

Ratio on the Setting Time and Strength of Cement. The authors were B. C. Craft, T. J. Johnson, and H. L. Kirkpatrick. The paper included the following studies: Effect of Water-Cement Ratio on the Setting of Cement in Long Columns, Effect of Temperature and Water-Cement Ratio on the Time of Initial Set and Compressive Strength, and Effect of Temperature and Pressure on the Time of Initial Set and Strength of Neat Portland Cement.

DR. KNIFFEN PUBLISHES PAPER ON BAYOU MANCHAC

In press is a paper by Dr. Fred B. Kniffen, entitled, *Bayou Manchac: A Physiographic Interpretation.* The paper deals with the genetic history of the bayou, as interpreted from the physiographic features associated with the stream.

CONFERENCE ON SOUTHERN PRE-HISTORY HELD AT L. S. U.

On December 27th Dr. Kniffen delivered a paper on the relationship between archaeology and geology in the dating of both Indian mounds and recent geological features in Louisiana. The paper was presented before the Conference on Southern Pre-History, held in Baton Rouge on the 27, 28 and 29 of December.

NORTHEAST LOUISIANA GAS REPORT

Captain R. P. Webb, Manager of the district office Minerals Division of Department of Conservation, Monroe, Louisiana, has just completed semi-annual regage of all gas wells in Northeast Louisiana with the following report:

On November 28, 1934, the date upon which semi-annual regage was completed, there were One Thousand and Ninety (1,090) wells in the Monroe district capable of producing gas with an openflow capacity of Six Billion Two Hundred Forty-Six Million Eight Hundred and Thirty-Nine Thousand (6,246,839,000) cubic feet per day.

The daily allowable withdrawals permitted under the statutes of Louisiana, after calculating each well's quota upon the amount of acreage allotted a given location, are One Billion Six Hundred and Six Million One Hundred and Thirty-Six Thousand (1,606,136,000) cubic feet per day.

The daily production from these wells for th
first nine months of 1934 amounted to One H
dred Forty-Four Billion Three Hundre
Million and Twenty-Six Thousand (144,3
000) cubic feet, or a daily average of F
dred Twenty-Eight Million Five Hundr
Thousand (528,512,000) cubic feet pe
approximately one-third (1/3) of the d
able, which slightly exceeds eight per)
of open flow capacity.

Continuous drilling is necessary to n a a
sufficient reserve to protect pipe-line acts,
most of which agree to keep at least three years' supply ahead of requirements. With these con
tions confronting the industry, we can look f

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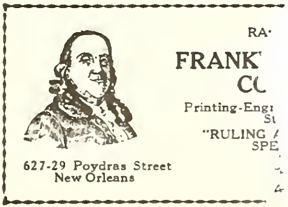

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ward to an active development program, both in the proven fields and wildcat areas. This is most desirable, as the money spent for labor, materials, and in the allied industries, gives employment to a large number of people, and it certainly behooves the State to encourage and foster all the development possible.

Carbon black accounted for consumption of Forty Billion Six Hundred Twelve Million Three Hundred Nine Thousand (40,612,309,000) cubic feet; field operations and gasoline plants accounted for Three Billion Fourteen Million Eight Hundred Ninety-One Thousand (3,014,891,000) cubic feet, with the remainder One Hundred Billion Six Hundred Seventy-Six Million, Eight Hundred Twenty-Six Thousand (100,676,826,000) cubic feet having been distributed by pipe-lines for domestic and industrial uses.

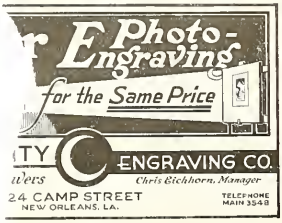
The use of natural gas, where available, is so
iversal and desirable that all public-spirited
ies and citizens should exert their best efforts,
imes, to encourage the maintenance of an
reserve of gas which will guarantee the
ainst any price increase for this valu-
This would be attempted should the
ply fall below the present reserves.

D FLOWERS OF LOUISIANA

(Continued From Page 7)

Some plants, on the other hand, such as cot-
n, have the stamens and pistils so arranged
t neither insects nor wind are necessary to ef-
pollination. These flowers are *self-polli-*
d.

r a pollen grain reaches the stigma, it ger-
, and sends a tiny thread down into the
The contents of the pollen grain are then
into the ovule, where they unite with
of the ovule. This union is called
The fertilized ovule then develops



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FROM ARCHIE SMITH

1795—"There is scarcely anything but ruin and despair."—William Pitt.

1837—"I dare not marry, the future is so dark and unsettled."—Samuel Wilberforce.

1848—"Nothing can save the British Empire from shipwreck."—Lord Shaftesbury.

1849—"In industry, commerce and agriculture there is no hope."—Disraeli.

1851—"I thank God that I shall be spared from seeing the consummation of ruin that is gathering around us."—Duke of Wellington.

1893—One hundred and sixty-nine railroads failed in the United States.

1929-33—A slight business hesitancy.

THE WAR ON WINGED PREDATORS?

(Continued From Pgae 38)

there is against them—every species deserves protection unless it is caught in the act of robbing the poultry yard.

If this contention seems too extreme and the sportsman claims the right to kill the birds destructive to game—the sharp-shinned, Cooper's and goshawks—let him remember that not one out of hundreds of his fellow shooters will identify these birds at sight. "Will" is used advisedly; anyone can. It has already been pointed out that most of the "goshawks" turned in for the Pennsylvania bounty were not goshawks.

We are on the threshold of the greatest, most inspiring, effort man has ever made to put wildlife under a long term management plan that will mean perpetuation and not destruction. If the President's Committee on Wildlife Restoration functions as successfully as its agenda indicates

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Phone: WAlnut 2992

it will, we need have no fears for a great many species—including those that bear the brunt of 7,000,000 guns.

The President's Committee should remember, however, that conservationally—if we may coin a word—as well as economically, there has been a Forgotten Man. It should never forget, for a single instant, that among these Forgotten Men few are in more straitened circumstances, few are fighting so desperate a battle for their very lives, as the hawks and owls.

Biologists studying the relations of our wild creatures one to another have not forgotten it. Government agents, computing the vast annual bill we pay for destruction by rodents, have not forgotten it. Non-killing outdoorsmen have not forgotten it.

They are asking the President's Committee one of the most important and pertinent questions it will be called upon to consider: *What about vermin?*

LOUISIANA'S MINERAL RESOURCES

Continued From Page 34)

part not to take cognizance of the terms of lease, was forced "to apply the principles of justice as laid down by the West Virginia Supreme Court and require of the plaintiff that he shall put the lessee on notice that he must drill before the expiration of any given period for which payment had been made, and thereafter refuse to receive it". Judge Dawkins stated further that "in time, the state may be compelled, through its legislative department, to make provisions for the protection of all who, by virtue of ownership of the surface, have a common interest in a proven oil or gas pool or sand. However, the courts cannot legislate and it is their duty to decide those questions as nearly in accord with justice and equity as possible".[197]

Louisiana has been fortunate in that its petroleum and natural gas production has been steady and that its Division of Minerals has encouraged such a policy, so that pipe line and refining centers were not forced to migrate across the map, but serve to build up stable and settled cities. Refining of petroleum in Louisiana has reached a stage of permanence and stabilization which may be altered very little by migratory oil production. This unusual condition existing in such a migratory industry along with more permanent conditions existing in the salt, sulphur, shell, sand, gravel, and other mineral industries of Louisiana has been largely responsible for such stable economic conditions prevailing in this State.

This third era has resulted in drastic changes in the conservation policies of both Federal and State Governments. Time is yet too short to show the full effect of these changes but the Department of Conservation is forging ahead and is beginning to carry out in a more comprehensive manner, another of its duties—that is, encouraging the development of those mineral resources which are considered of lesser importance. As we have seen, the Department has been alert and competent in administering its Conservation laws which prevented waste, but there are other types of waste such as incomplete utilization of the by products of mineral products and inefficient use of natural sources and power. Through the publication of reports of investigations being conducted by the newly established Geological Survey of the Department, the public and those interested industries will have greater opportunity to become familiar with Louisiana's mineral resources and it is anticipated that this program will result in a marked increase in the development of Louisiana's mineral industries.

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[197] *Ibid.*, p. 821.

SURVEY OF DEPARTMENT'S EFFORTS AND ACHIEVEMENTS UNDER COMMISSIONER MAESTRI

(Continued From Page 2)

lishment of fish and game preserves, Commissioner Maestri has placed numerous fish hatcheries at an average cost of $25,000 and several fish and game preserves at an average cost of $75,000. During the five years regime, Commissioner Maestri has established two new fish hatcheries and three new fish and game preserves.

FORESTRY

The reconstruction of our Forestry Division has been so efficient that we have been able to take on the additional work necessitated by the establishment of the Conservation Corps throughout the State with but little interruption in our regular routine. With the aid of this federal agency, the development of the Department's forestry activities have undoubt-

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edly proven this division to be one of the most efficient forestry bureaus in the entire Southern States.

MINERALS

In cooperating with the present National Recovery Act, the Department has found it necessary to bring to the New Orleans office the main branch of the Minerals Division, leaving sub-offices still in Lake Charles, Monroe, and Shreveport. The scope of this Division has been broadened to such an extent that all phases of industrial development have increased and many new industries have been brought to the State.

A State Geological Survey has been established in cooperation with the Louisiana State University and systematic geological reports on all parishes of the State are now in praparation.

OYSTERS AND WATER BOTTOMS

This Division has extended its activities in both the cultivated fields and the natural reefs of the State with such diligence and foresight that Louisiana, including in the estimate the oysters packed in Mississippi but produced in Louisiana, led the Nation in oyster production during 1934. This has been a gradual but steady increase from the position Louisiana held at the beginning of Commissioner Maestri's regime, which was third. This Division also has the supervision and control of the sand, gravel, and shell deposits of the State, which have likewise been handled advantageously.

SCIENTIFIC RESEARCH AND STATISTICS

Pollution, which has increased alarmingly the possibility of the destruction of fish life because of the numerous oil and gas wells being drilled and brought in in the waters of the State, has been given special study by this Bureau to the end that Louisiana may derive all of the benefits from this great under-ground wealth without the loss and total extinction of the fish life to be found in the waters. This problem is a comparatively recent one, but has been met with an efficiency which has kept abreast with the evident danger. This Bureau has, therefore, been able to devise methods with which the harm might be reduced to a minimum.

In addition this Bureau has rendered service to all of the other Divisions of the Department with a cooperation that has resulted in great assistance to the individual, as well as to the State and Nation.

WILDLIFE

The world-renowned wildlife sanctuaries of Louisiana, which cover some four hundred thousand acres, have been improved both as to protection and propagation facilities. These preserves, the first state-owned preserves in the United States, have proved to be a true sanctuary and resting place for the thousands of migatory birds that frequent the Louisiana shores every year.

The fur industry in Louisiana has been greatly stimulated by the proper regulations which have been so efficiently enforced by the Wild Life Division. Today Louisiana is world-famous as a great fur-producing state.

AN INTERESTING LETTER FROM A NORTHERN FUR TRADER

The following letter, which is self-explanatory, was recently received by the Bureau of Research of the Louisiana Department of Conservation, and reveals how wide spread throughout not only the United States but throughout the whole of North America is the interest in the work which the Department of Conservation is accomplishing.

The writer, Mr. Thomas Lamb, is a fur trader and general merchant of Moose Lake, Manitoba.

The Department will await with interest the report of Mr. Lamb's results in his project to study experimentally the migrations of Muskrats.

Moose Lake, Manitoba, Canada.
January 15, 1935.

The Bureau of Research,
Louisiana Department of Conservation,
New Orleans.

Dear Sir:

I am the lessee of a Muskrat Ranch of 54,000 acres located near here, in Northern Manitoba, and roughly 2000 miles North of your famous Cameron Parish Marshes.

I have read with great interest, your Bulletin 18—Fur Animals of Louisiana.

My Ranch is unfenced, of course, and I am planning to get a check on the movements of the animals by a banding system. There are no other Ranchers in this section of the country and my Ranch is surrounded on all sides by vacant Public Domain, and of Rat Swamp classification. This surrounding country is always heavily trapped, and indeed usually overtrapped, as our Department of Game and Fisheries makes no tangible effort to place their harvest under an adequate system of management.

It appear to me that the rats from my Ranch migrate outwards and stock the immediate surrounding country. It is chiefly to demonstrate this that I plan to use a tagging system.

It has occurred to me that you may know of some person who has tried this scheme. I am fully confident that I will have no difficulty in getting returns. I am concerned with the problem of placing a tag on the animal that will not come

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Some Helpful Suggestions to Birdhouse Builders

By
AMBROSE DAIGRE,
Department Taxidermist

SPRING brings us in a closer proximity to Nature than any other season of the year. We see green life upspringing from apparently lifeless branches. We witness the love season of the avian creatures and note the return of the birds from the Southland.

Now is the time for the bird lover to make preparation for this most wonderful season. In this respect I have reference to building homes for wild birds. If you have done your work well this spring you will experience a peace of mind, a satisfaction, which comes only to those who ardently love birds.

By my boyhood endeavors and failings in bird house construction, I feel that, I have gained knowledge, which may be helpful to the amateur.

In Louisiana, the bird most known to utilize man-made nesting sites, is the Purple Martin. The Martin is a summer resident of Louisiana. It departs for South America each autum, just as the ducks and geese leave the north each autumn to spend the winter months in the Southern States.

It is believed that long before the advent of white men to this country, martins nested in hollow trees. In some instances they still do so. We have learned that in early ages Indians hung up hollow gourds about their fields to encourage these birds. Martins ward off predatory and destructive birds. The Indians, knowing this, took advantage of the fact. Through long usage of boxes, these birds have become almost wholly dependent on man for nesting sites. Today, many Martins do not raise families because they do not find a ready prepared home.

The English Sparrow is the greatest enemy that the Martin has in Louisiana. This Sparrow remains here throughout the entire year and begins nesting early in February. It will nest practically anywhere, consequently it takes advantage of man-made homes, too. When the Martins return, they cannot find a place to nest, and, if by chance, some do, they have to put up warfare against these sparrows for weeks, months, or possibly the entire nesting season. It is the duty of those owning bird boxes to keep sparrows nests torn out until the Martins have returned and taken possession of them.

HOUSES

Any kind of well sheltered and well ventilated box will do. It is imperative that the entrance be at least four inches above the floor. This is to prevent the sparrows from pushing the Martin eggs from the nest. It is also necessary to have a small perch before the entrance. In some instances success has been had with bird hotels, but from my personal experience I have learned that Martins prefer to nest in pairs.

An eaved house 8″x8″8″, ventilated in the gable ends and having a 1½″ diameter entrance, is sufficient to house one brood of birds. A hinged door is a necessity to permit cleaning after each nesting season. Do not use metal for bird houses. In summer the heat from the sun will kill the birds.

LOCATION

If this is your first year to have Martin houses it is advisable to erect them in an open spot, approximately 15′ above ground. Martins will not occupy homes suspended from trees. They must be on a pole.

Once these birds raise a brood in a locality they will return year after year to the scene of their nesting, accompanied by their off-spring. This makes it necessary to increase the number of houses annually until you have as may as you want.

Under protection Martins become relatively tame and if you choose, you may lower the houses after the first nesting season to allow a closer observation of the birds.

Poles supporting boxes should have a broad galvanized metal strap (approximately 1½″ in width) around them, to prevent robbery by cats.

There are other bird species, in Louisiana, that will nest in houses; such as, the Woodpecker family, Bluebirds, certain species of Owls, Carolina Wrens and et cetera. These birds are timid and require some careful coaxing and strategy on the part of the bird house builder. Their houses should resemble nature as close as possible. For instance, a Woodpecker house should have the apperance of a hollow log, and must be attached to the trunk of a tree. A Bluebird's home may be of any design. It is advisable to suspend it from a strong branch and have it painted some protective color. Foreign odors are repellant to birds. Make sure to paint houses sufficiently early in order that the paint smell may vanish before nesting season.

It is time to build houses now. You may erect them in February. If you have a country home it will be simple to turn that idle lawn into an exquisite bird sanctuary—a college of avian learning—a scene of aesthetic beauty.

There is no greater medium to character training than the study of nature.

TO RECORD VOICES OF RARE BIRDS

An ornithological expedition of exceptional interest will include Louisiana in its itinerary during the next few weeks.

Dr. Arthur A. Allen, Professor of Ornithology at Cornell University and one of the most notable of North American ornithologists, will leave in March for special studies of rare birds in Florida, Louisiana and Oklahoma. An elaborate recording sound truck of special design will be used.

Associated with him in these researches will be Albert R. Brand of New York, who has worked out new methods for photographing both birds and the songs of birds. Dr. Allen hopes to secure for the first time records of the notes of the rare Ivory-billed Woodpecker, a species which it is possible has been exterminated everywhere else save in northern Louisiana.

AN INTERESTING LETTER FROM A NORTHERN FUR TRADER

(Continued from Page 46)

off, and yet will not injure the animal or hinder its movements.

I have thought of placing a band on the hind leg just above the foot, as is the practice in bird banding. I have also thought of placing the band on the tail, close to the body. I believe that No. 6 band, that you use for banding waterfowl, might be a suitable band, with such modifications that might appear desirable as the practice developes.

I would be glad if you would give me the result of any experience had, in this direction, in Louisiana, or within your knowledge.

I would also greatly value any suggestions you might make or advice you might give, bearing on this problem.

We have had unusually cold weather here during the past thirty days, and on one occasion it was fifty-eight below zero. We trust that our rat population is none the worse for the cold as they are isolated from the atmosphere above the surface. I am native to this region, and it did not occur to me that there was anything remarkable about the Muskrat's ability to live imprisoned by the ice for six and a half months of every year. Surely it is a wonderful performance, as the average White or Indian, is sorely taxed to keep himself warm and well and fed throughout the long and trying winters experienced here.

I plan to go to Louisiana in the not too distant future to see your Muskrat Ranches and the results of Conservation in your great State. It can't be so awful far after all, as we often get a tag from an Avery Island Pintail. I understand that your Muskrat Pelts are superior in quality to ours, but I propose to bring along one of our stuffed mosquitoes to show what this country can produce.

Thanking you in anticipation of your favor, I am

Yours truly,

(Signed) Thomas Lamb.

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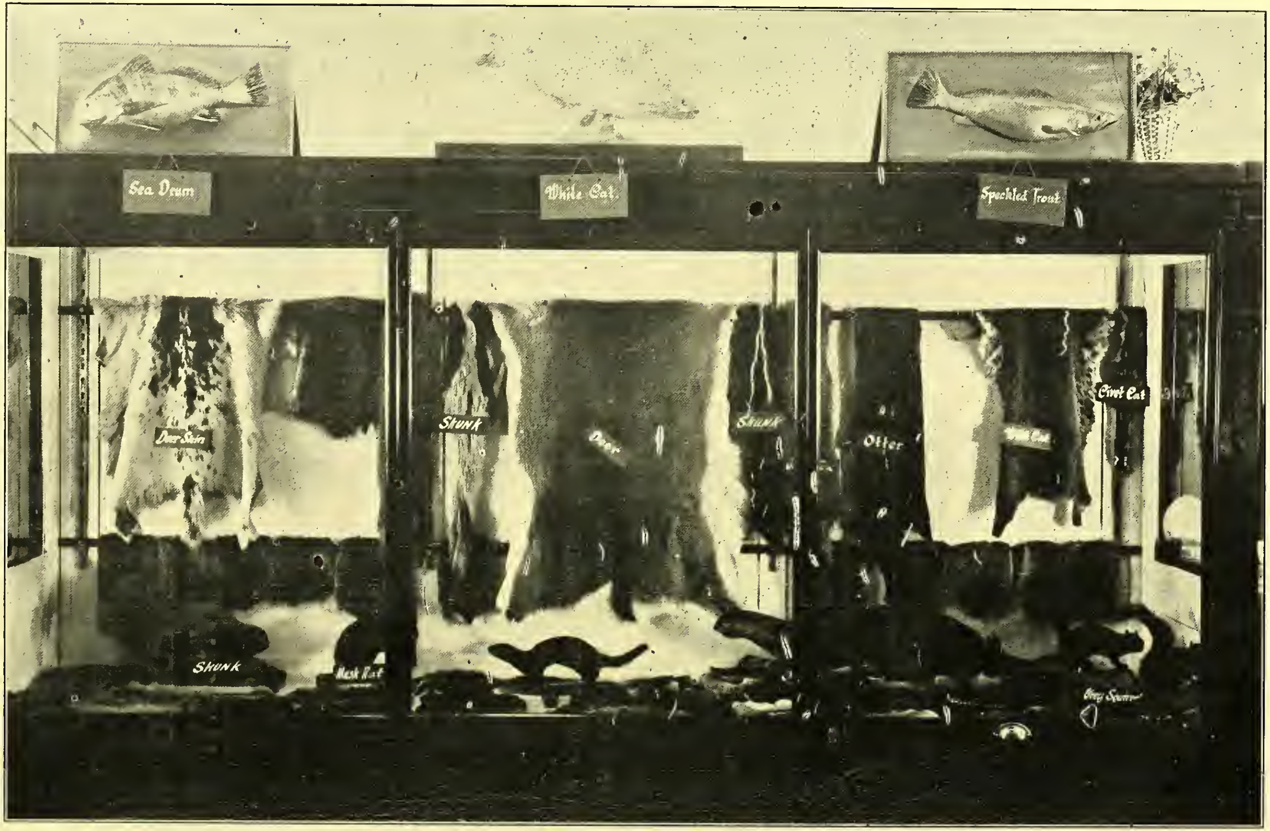

An Exhibit of Louisiana Fur Bearers in the Department of Conservation Museum. Louisiana's Fur Bearing Animals Yield an Annual Average of Six Million Pelts with a Value of Approximately Five Million Dollars.

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